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THE EFFECT OF RELEVANT EMOTIONAL CONTENT ON PERFORMANCE AND
LEARNING IN PROGRAMED INSTRUCTION.

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EXPERIMENTS WERE DESIGNED IN THIS RESEARCH TO DISCOVER
(1) THE VARIOUS CONDITIONS WHICH MITIGATE THE DISTURBING
EFFECTS OF ADVERSIVE EMOTIONAL CONTENT USED AS A MOTIVATING
STIMULUS AND (2) TECHNIQUES OF MOTIVATING THE STUDENT SO THAT
LONGER PROGRAMS OF INSTRUCTIONAL MATERIALS COULD BE MADE
INHERENTLY INTERESTING AND MORE EFFECTIVE. THE FIRST
EXPERIMENT WAS TO DETERMINE WHETHER THE INCLUSION OF RELEVANT
EMOTIONAL CONTENT, IN A SERIES OF SELF-INSTRUCTIONAL MANUALS
ON DRIVING, WOULD AFFECT LEARNING AND RETENTION OF THE
MATERIALS. SUBJECTS WERE NINTH-GRADE DRIVER EDUCATION
STUDENTS. THE INTENSITY AND ORDER OF PRESENTATION OF THE
EMOTIONAL STIMULI WERE VARIED SYSTEMATICALLY SO THAT RESULTS
COULD BE COMPARED WITH FINDINGS OF EXISTING RESEARCH, AND SO
THAT HYPOTHESES COULD BE GENERATED FOR PREDICTING HOW TO
MANIPULATE EMOTIONAL STIMULUS VARIABLES FOR MAXIMUM STUDENT
MOTIVATION. IN THE SECOND EXPERIMENT AN ATTEMPT WAS MADE TO
EXTEND THE FINDINGS OF THE FIRST EXPERIMENT. EXPERIMENT ONE
HAD FIVE INTENSITY CONDITIONS AND THREE ORDERS. EXPERIMENT
TWO HAD TWO LEVELS OF INTENSITY AND TWO PLACEMENT ORDERS. IN
LIGHT OF THE FINDINGS, A REVISED THEORETICAL POSITION WAS
TAKEN WHICH INDICATED TWO CONDITIONS FOR FACILITATING
LEARNING--THE AROUSAL OF SOME EVALUATIONAL TENSION AND THE
COGNITIVE LINKAGE OF THE TENSION TO THE STIMULUS SITUATION
AND TO THE RESPONSES TO BE LEARNED. (JC)

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ON PERFORMANCE AND LEARNING
IN PROGRAMMED INSTRUCTION

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I. THE RESEARCH PROGRAM -- Introduction, Objectives and Rationale

1.1 INTRODUCTION

The quest for identification of the variables that motivate school learning begins anew with programmed instruction. With longer programmed materials, student motivation has become a crucial variable. Among others, Green (1962, p. 199) reports that boredom increases as students work through a long program. One familiar method of increasing motivation in persuasive communications is the inclusion of emotionally heightened, content relevant materials. These emotional appeals are designed to evoke previously learned motives in the interest of the attitudes or behaviors recommended by the communicator.

Variables in programmed learning materials can be manipulated to arouse socially acquired motives such as need for achievement, conformity to group standards, power needs, and the more emotional drives arising from aggression, sympathy, anxiety and guilt. The experiments reported were designed to study the effects of one particular type of motive-incentive variable in programmed learning, namely the arousal of fear or anxiety by depicting potential dangers to which the audience might be exposed. Fear appeals of this kind are frequently used to influence attitudes and behavior in health and safety communications. The primary interest of this experiment is to determine the conditions under which the arousal of fear is effective, or ineffective, in motivating learning.

Our theory of the effects of fear-arousing communications is based on the work of Janis and Feshbach (1953). These authors, basing their formulation on Miller's (1951) theory of fear as a drive stimulus, assumed that the emotional tension aroused by fear appeals would serve as a motivational or drive stimulus. Two methods of reducing the emotional stimulation are possible. One is to learn the ways and means of warding off the anticipated dangers described in the instructional materials. The tendency to accept the reassuring beliefs or practices recommended may not always be the dominant reaction to a fear-arousing communication. Under certain conditions, other types of reactions can occur whose effect

is the reduction of emotional tension without learning new and reassuring responses. Janis and Feshbach have identified three such reactions which parallel patient responses to anxiety arousing verbal communications from a therapist. These three responses are: (1) failure to pay attention to what is being said; (2) rejection of the communicator's statements; and (3) attempts to ward off subsequent exposure to the anxiety-arousing content.

These authors performed a pioneering experiment which investigated the effects of presenting different degrees of threat in communications which attempted to motivate students to conform with a set of oral hygiene recommendations. They found no differences in learning of the recommendations, but the conformity to the recommended actions decreased as the intensity of fear-arousing material increased. They concluded that the degree of reassurance in the communication was not sufficient to relieve the arousal of fear, and the students, therefore, were motivated to ignore or minimize the importance of the strong threat.

1. 2 OBJECTIVES

These experiments have then two kinds of objectives. The first is the discovery of the conditions which mitigate the disturbing effects of aversive emotional content used as a motivating stimulus. The problem is to identify the consequences of fear-arousing communications and to identify means of promoting learning by reducing some of the interfering effects.

The second class of objectives is more immediate. One of these is to discover techniques of motivating the student, so that longer programs of instructional materials can be made inherently interesting and more effective.

An associated objective deals with a special class of educational subject matter -- individual and community hygiene and safety. The importance of having the student learn some of the less probable but more dangerous consequences of safety-related behavior is obvious. However, the existing research literature points out that fear-arousing communications generate a motivated forgetting of

the behaviors recommended. Since it is important to communicate a realistic and credible image of these fearful consequences (cigarette smoking is a current example), methods of communicating the information that are less likely to lead to distortion are important.

A final practical objective is the development of an effective programmed learning driver education manual. Current research in our program deals with the most effective response mode; this study of stimulus control will further increase the effectiveness of our basic driver education manual. This manual is intended for use in driver education courses, and remedial training courses throughout the country.

1.3 RATIONALE

Let us examine some of the more general variables involved in presenting aversive emotionally relevant content material. Two effects of a fear appeal may be hypothesized. The most obvious is the production of avoidance behavior. Since the effects of thinking about a painful event are unpleasant, the tendency is to reduce the source of unpleasant stimulation. The second effect of a threatening communication is the arousal of uncertainty, a situation in which the events named have probabilities other than one or zero.

From the subject's point of view, the threatened event is only one of many possible consequences. For example, driving over the speed limit may have multiple results. His uncertainty will be based on his estimate of (1) the classes of events that might occur, and (2) the probability of each of these classes occurring (adapted from Berlyne, 1960, p. 28). The purpose of the persuasive communication is to increase the subjective probability that the specified event will occur. When this succeeds, symbolic representation of that event will control the subject's subsequent behavior. More serious events, fatalities for example, have a lower objective probability than less serious events, and for most people a disproportionately low subjective probability. Safety communication attempts to increase

the subjective probability of that event, so that this potential aversive consequence can control the subject's current behavior.

A second source of uncertainty occurs for the learner who establishes the classes of available response to the potential threat and then assesses the probability of successfully averting the threat for each class of behavior. For example, many persons have assigned a probability of near zero to the value of underground shelters in averting death in the event of nuclear warfare and hence take no preventive actions.

Learning results from the reduction of both stimulus and response uncertainty. Learning may be interpreted (Green, 1962, p. 118) as a result of reducing a gap between a prior and a post action state of affairs. The learner must first select the effective stimulus that is to control his behavior. After making that decision, he must survey the range of his behavior repertory and decide which response is adequate to match the stimulating conditions. Finally, he has to decide whether or not he has succeeded in producing an adequate response. Generally, the greater the gap between the prior state of affairs and the post, the less likely a new response is to be learned, since the learner has simpler alternatives available.

Summarizing these interfering effects with learning, the use of aversive emotional content runs three risks: First, the avoidance behaviors may swamp the learning material, resulting in the subject's vivid recollection of the noxious possible events, but few of the coping procedures. Secondly, the subject may not establish the credibility of the event as a highly realistic possibility for which he should prepare. Third, the subject may feel insufficiently reassured about the procedure for averting such an eventuality. Education which attempts to increase his capabilities may fail at any one of these points.

The research program in which these experiments are conducted attempts to examine the conditions which provide for: (1) decreasing the avoidance response to the aversive events, (2) increasing the belief in the possibility of the

stimulus events, and (3) increasing the subject's certainty concerning his capacity to influence the occurrence of these events.

II. EXPERIMENT I

The first experiment dealt with the effect of degrees of emotional intensity and the order of presentation on learning. Since the overall research project of which this study is a part deals with the development of accident prevention and driver safety, the results of unreliable driving were depicted as having harmful consequences to the driver. Three levels of emotional intensity were used. High emotional intensity portrays the consequences of driving in which humans are severely hurt, requiring hospitalization, or killed. Moderate emotional intensity portrays the consequences of driving involving minor injury to individuals, property damage, or violations of law. Low emotional intensity was represented by a near-accident.

The second question is the effect of the ordering of emotional material on learning. Should the emotional material be placed before or after the procedures to be learned? In the usual teaching situation, such material is placed at the beginning of the learning sequence. Yet, research evidence available, cited below, indicates that the introduction of relevant fear-arousing communications interferes with learning and the degree of interference increases with the intensity. The interfering effects of emotional material may be reduced if the learner is first given the opportunity to reduce his uncertainty by learning the procedures needed to avert the accident.

A third question deals with whether the emotional intensity should be at the same or different levels. Furthermore, if the emotional intensity is to be at different levels, should the sequences be in ascending or descending sequence over a series of learning blocks. These variations in emotional intensity provide another means of alleviating the interfering effects of emotional material. Thus,

the interfering effects may be countered by a gradual build-up of emotional intensity. Learners will learn first the import of safe driving practices in preventing minor accidents, and then be exposed to more serious outcomes from low through moderate to high emotional intensity.

2.1 RATIONALE AND RELATED RESEARCH

Emotional stimulation and performance: an overview

Two different interests have prompted considerable study of the properties of attention-directing stimuli. One group interested in job performance has been concerned with the effects of these stimuli on performance decrement and has recently summarized the literature (Robins, McKendry and Hurst, 1961). Educators are more interested in the properties of stimuli which tend to promote learning, particularly emotional stimuli. A systematic review of the role of these stimuli in learning has recently appeared in a text concerned with the properties of stimuli that arouse attention, and promote learning and remembering (Berlyne, 1960).

These divergent interests in effects of emotional stimuli in both performance decrement and increment are understandable, as the literature indicates that intensity of stimulation (independent variable) is related to measures of efficiency (dependent variable). The relation between emotional stimulation and efficiency is apparently not simple. The maximum of efficiency is likely to coincide with moderate arousal, as behavior is not likely to be maximally effective in states of extreme excitement or somnolence. Berlyne (1960, p. 50) has characterized the relation between intensity of stimulation and efficiency as an inverted U-shaped function. For example, higher scores on an auditory tracking task appear when subjects are moderately well motivated than when they believe they are merely helping to calibrate the apparatus or when they are over-motivated with promises of high remuneration coupled with threats of electric shock for failure (Stennett, 1957). These

results, and those discussed below, suggest the greater efficiency for learning of moderate fear arousal.

The effect of intensity of fear-arousing stimulation

Janis and Feshbach (1953) performed a pioneering experiment which investigated the effects of presenting different degrees of threat in communications which attempt to motivate people to conform with a set of oral hygiene recommendations. They found no differences in the learning of the recommendations, but the conformity to the recommended actions decreased as the intensity of fear-arousing material increased. It appears that the degree of reassurance in the communication was not sufficient to relieve the arousal of fear, and the audience, therefore, was motivated to ignore or minimize the importance of the strong threat. This experiment suggests that considerable symbolic rehearsal is necessary to relieve the effects of strong fear stimulation, and that consequently milder fear arousal would promote more learning than a stronger threat.

The effects of order of communication

Cohen (1957) was concerned with whether information which was assumed to satisfy aroused needs would be accepted to a greater extent when it was presented before or after those needs had been aroused. The results indicate that the need-information order group showed more change than did the information-need group. These results suggest, as did the Janis and Feshbach study, the import of reducing uncertainty following the presentation of emotional stimulation. Thus, the effect of the order of presentation of emotional-non-emotional materials in programmed learning would depend upon whether there was the opportunity to reduce the fear aroused by the material.

Studies by Cowen (1952), Smock (1955) and Wesley (1953) on the effect of stress on response selection may be interpreted to indicate that under emotional stress the subject is likely to select the most pre-potent response.

The programmer's task is to make the desirable response the one most easily available during learning.

The effects of schedules of emotional stimulation on instrumental learning

Experimental efforts in this direction have used "distractors", anxiety-producing stimuli such as random shock (Eriksen and Wechsler, 1955), rather than emotional stimuli that were relevant to the learning situation. The results of Eriksen and Wechsler's study indicate no impairment of the ability to process information and a greater tendency to stereotypy in the randomly shocked group. Again, the alerting function of emotional stimulation and the tendency to select the pre-potent response may be advantageously used in programmed learning procedures.

The effect of gradually increasing the degree of fear stimulation on learning

Green (1962, p. 76) suggests that the disturbing consequences of aversive stimulation might not be so marked if the aversive state of affairs could be established gradually. As he indicates, there is no experimental evidence to support the argument. However, it suggests that the student might simultaneously be learning the responses necessary to cope with the aversive state of affairs while gradually learning to cope with the emotional tension generated by the communication through an adaptation process. Thus, we would expect that a gradual increase in fear arousal would be more effective.

Individual differences: the effects of anxiety, intelligence and task difficulty on response to fear stimulation

A number of studies (Goldstein, 1959; Janis and Feshbach, 1955; Taylor and Spence, 1952; Montague, 1953; Lazarus and Eriksen, 1952; Kerrick, 1956; Hilgard et. al., 1951; Grice, 1955) indicate that the level of emotional stimulation within the person (anxiety), intelligence level and task difficulty, are conditions that influence learning under stress. The level of emotional excitement internally and externally produced has the same effect on performance cited in the prior section: an inverted U-curve. This level of

emotional excitement is added to by such internal variables as anxiety and IQ, as well as external variables such as task difficulty. Anxious persons do better on simple tasks, whereas they tend to perform less ably than non-anxious persons on more complex tasks. Similarly IQ may be interpreted as contributing to task difficulty in that the same task becomes more complex for the less capable person. We assume, therefore, a common pool of emotional tension and uncertainty which can receive increments from a variety of stimulus conditions. Again, in programmed learning, the reduced complexity of the learning task may be more effective for the already anxious and low IQ subjects, but not sufficiently arousing for the more intelligent and less anxious learners.

2.2 METHOD

Experiment I of the Emotional Content Study was conducted at the Falls Church High School, Falls Church, Virginia, during September, October and November of 1963. The purpose of this experiment was to determine whether the inclusion of relevant emotional content, in a series of self-instructional manuals on driving, would affect the learning and retention of the material. The intensity and order of presentation of the emotional stimuli were varied systematically so that subsequent results could be compared with findings of existing research, and so that hypotheses could be generated which would predict how to manipulate emotional stimulus variables (within a programmed learning format) for maximum student motivation.

The learning program

The learning program consisted of 14 chapters of information on safe driving principles. It was written in linear form, with a constructed-word mode of response. The first two manuals (7 chapters) dealt with routine principles of driving, the last two (7 additional chapters) with emergency driving procedures. The difference between the two types of material is exemplified by two of the chapter headings: "Parking Regulations" (routine), and "Loss of Brakes" (emergency).

The emotionally-toned stories consisted of two or three paragraphs depicting drivers in potentially dangerous traffic situations. The stories were followed by program frames which required the student to respond to the content of the stories. The number of frames following the story was generally consistent with and proportional to the number of frames in the learning unit, the ratio being about 1 : 6. Thus an emotional insert included the story and its follow-up frames.

There were, in all, six such emotional inserts. Three of the inserts corresponded to as many of the chapters on routine driving principles, while the other three inserts corresponded to the same number of chapters on emergency driving procedures. The theme of the stories was always cue-relevant, that is, the driver in the story violated or failed to execute one or more of the driving principles taught in the corresponding chapter.

Intensity Variable

Each story stem could be fitted with one of three endings describing the outcome of the incident. Low level intensity endings (level I) were characterized by nothing of any consequence happening, other than the driver realizing he had committed an error. Moderate level endings (level II) featured an accident with some property damage or an arrest, but no personal injury. In the High level endings (level III) there was an accident in which someone was seriously hurt or killed, and the injuries were described in vivid, concrete, terms. See Appendix 1 for a sample story with Level I, II, and III endings.

Order Variable

The emotional inserts were constructed so that they could be placed either Before (B) or After (A) the chapter to which they corresponded.

Experimental Design

The design of Experiment I had five Intensity conditions and three Orders, as seen in Table 1. The Intensity conditions were: Control - Ss in this group had no emotional inserts in their programmed manuals; Low intensity level - for this group all six inserts were of low emotionality; Moderate - six inserts, all with moderate endings; High - all six inserts had highly emotional endings; Mixed levels - each individual in this group was exposed to two each of the low, moderate, and high endings arranged in one or another of six sequential patterns, as follows:

Sub-group 1.	I	II	III	-	I	II	III	(low, moderate, high, low, moderate, high)
" "	2.	II	III	I	-	II	III	I
" "	3.	III	I	II	-	III	I	II
" "	4.	I	I	II	-	II	III	III
" "	5.	II	II	III	-	III	I	I
" "	6.	III	III	I	-	I	II	II

The Orders of emotional stimulation were: After - the six emotional inserts followed their correspondent chapters; Before - the six inserts directly preceded their correspondent chapters; Mixed orders - each subject in this group received both orders three times. The Mixed order group was composed of the following three sub-groups: A A A B B B, B B B A A A, and A B A B A B.

TABLE 1

COMPARISONS ON EIGHT SEMANTIC DIFFERENTIAL SCALES OF RATINGS OF GROUPS EXPOSED TO LOW, MODERATE, AND HIGH THREAT MESSAGES (THE NUMERICALLY GREATER THE MEAN RATING, THE CLOSER IT IS TO THE SECOND OF THE PAIR OF ADJECTIVES IN THE LEFT-HAND COLUMN)

SEMANTIC SCALES	SEX	SD	HIGH vs. MODERATE INTENSITY GROUPS			HIGH vs. LOW INTENSITY GROUPS			MODERATE vs. LOW INTENSITY GROUPS		
			HIGH	MOD.	Diff. p	HIGH	LOW	Diff. p	MOD.	Means (N)	Diff. p
Calm-Excited	Males	6.32	26.66 (29)	23.37 (27)	3.29 <.10	26.66 (29)	26.15 (26)	0.51 -	23.37 (27)	26.15 (26)	2.78 -
	Females	4.77	28.41 (27)	26.30 (27)	2.11 -	28.41 (27)	28.65 (26)	-0.24 -	26.30 (27)	28.65 (26)	2.35 <.10
Wonderful-Terrible	Males	4.13	30.00 (29)	25.67 (27)	4.33 <.001	30.00 (29)	27.46 (26)	2.54 <.05	25.67 (27)	27.46 (26)	1.79 -
	Females	3.96	34.19 (27)	28.19 (27)	6.00 <.001	34.19 (27)	28.92 (26)	5.27 <.001	28.19 (27)	28.92 (26)	0.73 -
Reckless-Careful	Males	6.44	23.86 (29)	24.63 (27)	-0.77 -	23.86 (29)	26.48 (25)	-2.62 -	24.63 (27)	26.48 (25)	1.85 -
	Females	5.88	23.07 (27)	23.04 (27)	0.03 -	23.07 (27)	22.23 (26)	0.84 -	23.04 (27)	22.23 (26)	0.81 -
Good-Bad	Males	3.97	29.69 (29)	26.96 (24)	2.73 <.05	29.69 (29)	27.81 (26)	1.88 <.10	26.96 (24)	27.81 (26)	0.85 -
	Females	4.00	34.33 (27)	28.19 (27)	6.14 <.001	34.33 (27)	29.50 (26)	4.83 <.001	28.19 (27)	29.50 (26)	1.31 -
Nice-Awful	Males	4.07	33.14 (28)	28.42 (26)	4.72 <.001	33.14 (28)	29.80 (25)	3.34 <.005	28.42 (26)	29.80 (25)	1.38 -
	Females	3.43	36.26 (27)	30.85 (27)	5.41 <.001	36.26 (27)	31.58 (26)	4.68 <.001	30.85 (27)	31.58 (26)	0.73 -
Light-Heavy	Males	4.24	27.50 (28)	23.96 (26)	3.54 <.005	27.50 (28)	27.28 (25)	0.22 -	23.96 (26)	27.28 (25)	3.32 <.01
	Females	4.82	32.41 (27)	26.22 (27)	6.19 <.001	32.41 (27)	26.96 (26)	5.45 <.001	26.22 (27)	26.96 (26)	0.74 -
Phony-Real	Males	6.09	31.21 (29)	30.89 (27)	0.32 -	31.21 (29)	32.23 (26)	-1.02 -	30.89 (27)	32.23 (26)	1.34 -
	Females	4.67	34.07 (27)	33.59 (27)	0.48 -	34.07 (27)	33.69 (26)	0.38 -	33.59 (27)	33.69 (26)	0.10 -
Dull-Interesting	Males	4.96	30.45 (29)	28.50 (26)	1.95 -	30.45 (29)	29.48 (25)	0.97 -	28.50 (26)	29.48 (25)	0.98 -
	Females	4.56	33.19 (27)	30.48 (27)	2.71 <.05	33.19 (27)	31.23 (26)	1.96 -	30.48 (27)	31.23 (26)	0.75 -

Subjects

The 5x3 design thus had 15 cells. Eighteen Ss were randomly assigned to each cell of the design, bringing the total N to 270. Of each of the eighteen individuals per cell, 9 were male, 9 female.* The subjects were ninth grade driver education students from Falls Church High School.

Procedure

Prior to starting the learning program, Ss took the 20-item Driver Knowledge Test and the Taylor Manifest Anxiety Test. The four programmed manuals were completed, on the average, in four 55 minute periods. After finishing the last manual, Ss not in the Control condition filled out the Semantic Differential Scales, making ratings as to the subjective intensities of the inserts they had read. Then all Ss took the 145-item Final Examination for the first time (immediate test). One month later Ss took the Final Examination a second time (delayed test). Appendix 2 contains copies of the Driver Knowledge Test, Final Examination, and the Semantic Differential rating scale.

2.3 RESULTS

Equivalence of Treatment Groups

The Driver Knowledge Test scores were treated with analysis of variance to test the null hypothesis that there were no reliable differences between the experimental treatment groups on the basis of pre-(experimental) knowledge of driving information. The scores of males and females were analyzed separately to keep interaction effects at a minimum. Walker and Lev's approximate method for unequal frequencies in the sub-classes was used in making the computations (Walker and Lev, 1953, p. 381-2). The null hypothesis was verified statistically; it was therefore assumed the treatment groups were comparable on driver knowledge previous to the experimental induction.

Affective Responses

Each subject exposed to emotional stimuli was required to make ratings on a seven-point scale concerning his affective reactions to the stimuli. It is expected that this analysis will corroborate the assumption concerning the use of the emotional variable, i.e., that inserts with high-toned endings are more provocative than moderate endings which, in turn, are more excitatory than low-toned endings.

The summary table for analysis of adjective ratings is given as Table 1. This analysis serves to show whether induction of the main threat variable was effective in terms of an external criterion, viz., ratings by groups exposed to the low, moderate and high threat stimuli (threatening stories) on several dimensions of an Osgood type semantic differential scale. For purposes of analysis the six scores pertaining to the six emotional inserts were summed. Thus a score of 6 represents the lowest possible rating on the particular dimension, 42 the highest rating, and 24 neutrality, e.g., neither "good" nor "bad" on a seven point scale:

*Although an equal number of Ss was assigned to each cell, there were drop-outs and long term absentees who diminished the total sample and left cell n's unequal. Also, random assignation of the Mixed intensities condition to sexes made for disproportionate numbers of males and females in the cells of the Mixed intensities condition.

GOOD _____ : _____ : _____ : _____ : _____ : _____ : _____ BAD
 6 12 18 24 30 36 42

In all there were eight dimensions or scales evaluating the stories according to eight semantic criteria. These are presented in Table 1, together with results of comparisons between Low versus Moderate, Low versus High, and Moderate versus High threat treatment groups.

As can be seen in Table 1, there are obvious and highly significant differences between the High versus Moderate and the High versus Low groups. Subjects in the High threat group consistently rate closer to the "Terrible," "Bad," "Awful," and "Heavy" ends of the scales than do subjects in either the Moderate or Low threat groups. This indicates greater negative affect for the High threat group, and suggests the intended experimental manipulation was accomplished in the case of High threat messages.

Credibility

The intended manipulation between the class of endings called "Moderate" and that called "Low" was not affected, according to the data. The conclusion is that Low and Moderate forms of the messages must be considered equivalent. Both represent mild fear stimulation compared to the reliably stronger High threat endings.

A statistical examination of certain of the adjective scales (e.g., DULL - INTERESTING, PHONY - REAL) provided evidence relative to the credibility of the story endings. There were no reliable differences between High versus Moderate or Low threat groups on the "Phony-Real" or the "Dull-Interesting" dimensions (with the exception that females rated High endings as more interesting than Moderate endings). For purposes of theoretical interpretation it is gratifying that High threat endings were seen as being as realistic or plausible as Low or Moderate endings, and about of equal interest.

Learning and retention of safe driving practices

An information test was given in the fourth class session after completion of the programmed materials and repeated one month later. The test consisted of 145 items, 71 on the "routine" aspects of driving, 74 on "emergency" procedures.

The analysis of main effects on the Final Examination scores were also computed with the Walker and Lev approximate method for unequal sub-class frequencies. In all, eight sets of Final Examination scores were treated with this method. They were:

males, immediate test scores, routine driving information
 males, immediate test scores, emergency driving information
 males, delayed test scores, routine driving information
 males, delayed test scores, emergency driving information

females, immediate test scores, routine driving information
 females, immediate test scores, emergency driving information
 females, delayed test scores, routine driving information
 females, delayed test scores, emergency driving information

From the results shown in Table 2, it is clear that there was a reliable Order effect for the males, on both the immediate and delayed tests, but only with the emergency driving materials. For females there was a significant Intensity effect on the delayed scores, again, only with the emergency driving material. Neither intensity nor order appeared to have any effect on the routine material associated with the first three of the series of six emotional inserts. Also noteworthy is the delay phenomenon: the main effect of intensity for females appeared only on the delayed test scores, and the order effect for males was more pronounced on the delayed test than on the immediate test.

Table 3 presents the learning scores for the tests where the largest differences occurred, the delayed test for the emergency material. This table indicates that, for the males, reading the emotional case study before learning the appropriate responses was the least effective procedure. This effect was not present for the females. This table also indicates the superiority of the low and moderate intensity of fear arousal for the girls, a condition which is not as marked for the boys.

Effects of intensity of fear arousal on learning

A more detailed examination of the effects of intensity is provided in Table 4. The semantic ratings of the emotional impact of the low and moderate threat conditions showed no differences between these conditions. This finding is borne out by an examination of the delayed test scores.

However, a comparison of the low and moderate threat conditions to the high and control conditions is critical to our interest in the effects of fear arousal on learning. Comparing the milder (low and moderate) threat arousal condition to the control group, the milder threat condition was more or equally effective in all conditions (N=16), a highly significant result. Comparing the milder (low and moderate) threat to the high threat condition, we find that the milder threat condition is more efficient for learning in all conditions (N=18). The difference is significant for the girls in the delayed emergency test. It is also significant for both sexes combined in comparing the moderate to the high threat group on the emergency information test. Comparing the control to the high threat condition, no differences are found.

Summarizing these results, mild threat was more effective in producing learning than either a control or high threat condition. These effects were all consistent, but sharper for the girls, the delayed test, and the emergency driving information.

Sex and emotional intensity

The interaction of sex with the Mixed intensities treatment was very pronounced. As noted above, the Mixed intensities treatment was the most effective treatment for females, and the least effective for males. In comparing the magnitude of the means, the mixed intensity treatment was least effective for the boys, and most effective for the girls. Although few of the differences reached significance, the mean scores for the boys in the Mixed intensity condition were lower than any of the other conditions. This

TABLE 2

ANALYSES OF VARIANCE OF CORRECT RESPONSES OF MALES AND FEMALES
FOR ROUTINE AND EMERGENCY DRIVING INFORMATION,
ON THE IMMEDIATE AND DELAYED OCCASIONS OF TESTING

MALESRoutine Info., Immediate Test

Source	df	MS	F
Order (O)	2	3.40	1.41
Intensity (I)	4	1.98	0.83
O x I	6	3.35	1.38
Error-O*	94	2.42	
Error-I	118	2.38	

Routine Info., Delayed Test

Source	df	MS	F
Order (O)	2	2.52	0.77
Intensity (I)	4	6.99	1.89
O x I	6	8.72	2.67***
Error-O	89	3.27	
Error-I	113	3.70	

Emergency Info., Immediate Test

Source	df	MS	F
Order (O)	2	20.32	3.33**
Intensity (I)	4	6.32	1.06
O x I	6	2.40	0.39
Error-O	88	6.11	
Error-I	112	5.95	

Emergency Info., Delayed Test

Source	df	MS	F
Order (O)	2	24.16	5.37****
Intensity (I)	4	9.74	2.18
O x I	6	4.89	1.09
Error-O	87	4.50	
Error-I	111	4.46	

* Note: There are separate error terms for Order and Intensity because the scores for the Control Group (which had no story inserts) were excluded in the analysis of Order.

** $p < .05$

*** $p < .025$

**** $p < .01$

TABLE 2 (cont.)

ANALYSES OF VARIANCE OF CORRECT RESPONSES OF MALES AND FEMALES
FOR ROUTINE AND EMERGENCY DRIVING INFORMATION,
ON THE IMMEDIATE AND DELAYED OCCASIONS OF TESTING

FEMALESRoutine Info., Immediate Test

Source	df	MS	F
Order (O)	2	0.52	0.21
Intensity (I)	4	1.03	0.38
O x I	6	1.40	0.56
Error-O*	94	2.50	
Error-I	116	2.68	

Routine Info., Delayed Test

Source	df	MS	F
Order (O)	2	8.60	2.84
Intensity (I)	4	5.40	1.72
O x I	6	1.20	0.40
Error-O	90	3.03	
Error-I	114	3.14	

Emergency Info., Immediate Test

Source	df	MS	F
Order (O)	2	0.65	0.15
Intensity (I)	4	11.46	2.40
O x I	6	3.35	0.76
Error-O	93	4.42	
Error-I	117	4.77	

Emergency Info., Delayed Test

Source	df	MS	F
Order (O)	2	0.68	0.15
Intensity (I)	4	14.26	3.03***
O x I	6	3.46	0.74
Error-O	83	4.66	
Error-I	107	4.70	

* Note: There are separate error terms for Order and Intensity because the scores for the Control Group (which had no story inserts) were excluded in the analysis of Order.

** $p < .05$

*** $p < .025$

**** $p < .01$

MEAN PER CENT OF CORRECT RESPONSES ON THE DELAYED TEST,
EMERGENCY DRIVING MATERIAL, FOR ALL TREATMENT GROUPS

		<u>INTENSITIES</u>					
		<u>Control</u>	<u>Low</u>	<u>Moderate</u>	<u>High</u>	<u>Mixed</u>	<u>Combined Intensities</u>
	<u>n</u>	9	8	8	9	12	37
	<u>X%</u>	79.3	79.5	84.6	73.8	74.8	77.6
After	<u>n</u>	9	8	8	9	6	31
	<u>X%</u>	81.2	74.0	73.4	67.8	69.7	71.2
Before	<u>n</u>	9	9	8	9	5	31
	<u>X%</u>	70.4	85.1	85.7	86.3	68.9	82.9
Mixed	<u>n</u>	27	25	25	27	23	
	<u>X%</u>	77.0	79.7	81.2	75.9	72.3	
<u>ORDER</u>	<u>n</u>						
	<u>X%</u>						

		<u>INTENSITIES</u>					
		<u>Control</u>	<u>Low</u>	<u>Moderate</u>	<u>High</u>	<u>Mixed</u>	<u>Combined Intensities</u>
After	<u>n</u>	9	9	9	7	5	30
	<u>X%</u>	67.8	74.6	70.2	72.1	79.1	73.4
Before	<u>n</u>	9	8	8	8	7	31
	<u>X%</u>	70.6	74.4	77.2	65.1	76.3	73.1
Mixed	<u>n</u>	9	8	8	7	11	34
	<u>X%</u>	67.0	75.5	77.4	61.4	75.1	72.9
Combined Orders	<u>n</u>	27	25	25	22	23	
	<u>X%</u>	68.5	74.8	74.6	66.1	76.3	

TABLE 4

COMPARISONS OF INTENSITY GROUP MEANS FOR MALES, FEMALES, AND SEXES COMBINED ON THE ROUTINE (Rou) AND EMERGENCY (Emr) SECTIONS OF THE IMMEDIATE (I) AND DELAYED (II) TESTS

Comparison	MALES		FEMALES		SEXES COMBINED	
	Means (N)	Diff. P	Means (N)	Diff. P	Means (N)	Diff. P
<u>Low - Control</u>						
	<u>Low - Control</u>		<u>Low - Control</u>		<u>Low - Control</u>	
Rou I	36.9 (27)	- 35.6 (27) 1.3	-	-	35.6 (53)	- 34.3 (52) 1.3
Rou II	37.2 (26)	- 34.9 (27) 2.3	-	-	35.7 (52)	- 33.9 (54) 1.8
Emr I	36.6 (25)	- 36.6 (27) 0.0	-	-	36.1 (51)	- 34.7 (54) 1.4
Emr II	37.5 (25)	- 36.2 (27) 1.3	-	-	36.3 (50)	- 34.2 (54) 2.1
<u>Moderate - Control</u>						
	<u>Moderate - Control</u>		<u>Moderate - Control</u>		<u>Moderate - Control</u>	
Rou I	36.0 (27)	- 35.6 (27) 0.4	-	-	35.4 (54)	- 34.3 (52) 1.1
Rou II	37.5 (24)	- 34.9 (27) 2.6	-	-	36.2 (49)	- 33.9 (54) 2.3
Emr I	38.3 (24)	- 36.6 (27) 1.7	-	-	37.0 (51)	- 34.7 (54) 2.3
Emr II	38.2 (24)	- 36.2 (27) 2.0	-	-	36.6 (49)	- 34.2 (54) 2.4
<u>Mixed - Control</u>						
	<u>Mixed - Control</u>		<u>Mixed - Control</u>		<u>Mixed - Control</u>	
Rou I	34.6 (25)	- 35.6 (27) -1.0	-	-	34.9 (52)	- 34.3 (52) 0.6
Rou II	34.7 (24)	- 34.9 (27) -0.2	-	-	35.1 (50)	- 33.9 (54) 1.2
Emr I	34.5 (25)	- 36.6 (27) -2.1	-	-	35.8 (52)	- 34.7 (54) 1.1
Emr II	34.0 (23)	- 36.2 (27) -2.2	-	-	34.9 (46)	- 34.2 (54) 0.7

COMPARISONS OF INTENSITY GROUP MEANS FOR MALES, FEMALES, AND SEXES COMBINED ON THE ROUTINE (Rou) AND EMERGENCE (Emr) SECTIONS OF THE IMMEDIATE (I) AND DELAYED (II) TESTS

Comparison	MALES			FEMALES			SEXES COMBINED		
	Means (N)	Diff.	P	Means (N)	Diff.	P	Means (N)	Diff.	P
<u>High - Control</u>									
	<u>High - Control</u>			<u>High - Control</u>			<u>High - Control</u>		
Rou I	35.7 (27) - 35.6 (27)	0.1	-	33.7 (26) - 32.9 (25)	0.8	-	34.7 (53) - 34.3 (52)	0.4	-
Rou II	36.3 (27) - 34.9 (27)	1.4	-	32.6 (25) - 32.8 (27)	-0.2	-	34.5 (52) - 33.9 (54)	0.6	-
Emr I	35.0 (27) - 36.6 (27)	-1.6	-	32.8 (25) - 32.9 (27)	-0.1	-	33.9 (51) - 34.7 (54)	-0.8	-
Emr II	35.7 (27) - 36.2 (27)	-0.5	-	31.1 (22) - 32.2 (27)	-1.1	-	33.6 (49) - 34.2 (54)	-0.6	-
<u>Low - High</u>				<u>Low - High</u>			<u>Low - High</u>		
	<u>Low - High</u>			<u>Low - High</u>			<u>Low - High</u>		
Rou I	36.9 (27) - 35.7 (27)	1.2	-	34.2 (26) - 33.7 (26)	0.5	-	35.6 (53) - 34.7 (53)	0.9	-
Rou II	37.2 (26) - 36.3 (27)	0.9	-	34.2 (26) - 32.6 (25)	1.6	-	35.7 (52) - 34.5 (52)	1.2	-
Emr I	36.6 (25) - 35.0 (26)	1.6	-	35.5 (26) - 32.8 (25)	2.7	-	36.1 (51) - 33.9 (51)	2.2	-
Emr II	37.5 (25) - 35.7 (27)	1.8	-	35.2 (25) - 31.1 (22)	4.1	<.05	36.3 (50) - 33.6 (49)	2.7	<.10
<u>Moderate - High</u>				<u>Moderate - High</u>			<u>Moderate - High</u>		
	<u>Moderate - High</u>			<u>Moderate - High</u>			<u>Moderate - High</u>		
Rou I	36.0 (27) - 35.7 (27)	0.3	-	34.8 (27) - 33.7 (26)	1.1	-	35.4 (54) - 34.7 (53)	0.7	-
Rou II	37.5 (24) - 36.3 (27)	1.2	-	35.0 (25) - 32.6 (25)	2.4	-	36.2 (49) - 34.5 (52)	1.7	-
Emr I	38.3 (24) - 35.0 (26)	3.3	-	35.8 (27) - 32.8 (25)	3.0	-	37.0 (51) - 33.9 (51)	3.1	<.05
Emr II	38.2 (24) - 35.7 (27)	2.5	-	35.1 (25) - 31.1 (22)	4.0	<.05	36.6 (49) - 33.6 (49)	3.0	<.05
<u>Mixed - High</u>				<u>Mixed - High</u>			<u>Mixed - High</u>		
	<u>Mixed - High</u>			<u>Mixed - High</u>			<u>Mixed - High</u>		
Rou I	34.6 (25) - 35.7 (27)	-1.1	-	35.2 (27) - 33.7 (26)	1.5	-	34.9 (52) - 34.7 (53)	0.2	-
Rou II	34.7 (24) - 36.3 (27)	-1.6	-	35.4 (26) - 32.6 (25)	2.8	<.10	35.1 (50) - 34.5 (52)	0.6	-
Emr I	34.5 (25) - 35.0 (26)	-0.5	-	37.0 (27) - 32.8 (25)	4.2	<.05	35.8 (52) - 33.9 (51)	1.9	-
Emr II	34.0 (23) - 35.7 (27)	-1.7	-	35.9 (23) - 31.1 (22)	4.8	<.05	34.9 (46) - 33.6 (49)	1.3	-

TABLE 4 (cont.)

COMPARISONS OF INTENSITY GROUP MEANS FOR MALES, FEMALES, AND SEXES COMBINED ON THE ROUTINE (Rou) AND EMERGENCY (Emr) SECTIONS OF THE IMMEDIATE (I) AND DELAYED (II) TESTS

Comparison	MALES			FEMALES			SEXES COMBINED		
	Means (N)	Diff.	P	Means (N)	Diff.	P	Means (N)	Diff.	P
<u>Low - Mixed</u>									
	<u>Low - Mixed</u>			<u>Low - Mixed</u>			<u>Low - Mixed</u>		
Rou I	36.9 (27)	- 34.6 (25)	2.3	-	34.2 (26)	- 35.2 (27)	-1.0	-	-
Rou II	37.2 (26)	- 34.7 (24)	2.5	-	34.2 (26)	- 35.4 (26)	-1.2	-	-
Emr I	36.6 (25)	- 34.5 (25)	2.1	-	35.5 (26)	- 37.0 (27)	-1.5	-	-
Emr II	37.5 (25)	- 34.0 (23)	3.5	<.10	35.2 (25)	- 35.9 (23)	-0.7	-	-
<u>Moderate - Mixed</u>									
	<u>Moderate - Mixed</u>			<u>Moderate - Mixed</u>			<u>Moderate - Mixed</u>		
Rou I	35.0 (27)	- 34.6 (25)	1.4	-	34.8 (27)	- 35.2 (27)	-0.4	-	-
Rou II	37.5 (24)	- 34.7 (24)	2.8	-	35.0 (25)	- 35.4 (26)	-0.4	-	-
Emr I	38.3 (24)	- 34.5 (25)	3.8	<.10	35.8 (27)	- 37.0 (27)	-1.2	-	-
Emr II	38.2 (24)	- 34.0 (23)	4.2	<.05	35.1 (25)	- 35.9 (23)	-0.8	-	-
<u>High - Mixed</u>									
	<u>High - Mixed</u>			<u>High - Mixed</u>			<u>High - Mixed</u>		
Rou I	35.7 (27)	- 34.6 (25)	1.1	-	33.7 (26)	- 35.2 (27)	-1.5	-	-
Rou II	36.3 (27)	- 34.7 (24)	1.6	-	32.6 (25)	- 35.4 (26)	-2.8	-	-
Emr I	35.0 (26)	- 34.5 (25)	0.5	-	32.8 (25)	- 37.0 (27)	-4.2	<.05	-
Emr II	35.7 (27)	- 34.0 (23)	1.7	-	31.1 (22)	- 35.9 (23)	-4.8	<.05	-
Rou I	SD = 4.57			SD = 4.78			SD = 4.74		
Rou II	SD = 5.72			SD = 5.17			SD = 5.56		
Emr I	SD = 7.05			SD = 6.36			SD = 6.77		
Emr II	SD = 6.34			SD = 6.00			SD = 6.34		

difference was greater for the milder threat conditions (low and moderate) and when measured by the delayed emergency information test.

For the girls the mixed condition was superior to the high threat and control conditions for the delayed tests, and significant for the emergency information test, both immediate and delayed.

Effect of schedule of fear arousal

The mixed intensity treatment consisted of a variety of combinations of fear-intensity cases to provide some information about the effects of various orders. Although the N's are very small, the data match our initial speculations concerning the mitigating effects of gradually increasing the degree of fear arousal. Breakdown of this treatment into its component sub-treatments is seen in Table 5.

TABLE 5
MEAN PER CENT CORRECT RESPONSES
FOR MALES AND FEMALES WITH MIXED INTENSITIES
(Final three code numerals shown)

		I II III	II III I	III I II	II III III	III II	I II II
MALES	<u>n</u>	3	5	2	4	6	3
	<u>X%</u>	76.5	74.0	47.8	70.2	74.0	80.2
FEMALES	<u>n</u>	5	3	7	4	2	2
	<u>X%</u>	82.1	75.9	71.4	75.5	76.5	80.8
ALL Ss	<u>n</u>	8	8	9	8	8	5
	<u>X%</u>	80.9	74.6	66.1	72.7	74.6	80.4

The percentage figures in Table 5 indicate that no matter what the particular combination of intensities, a mixture per se works for better retention with females than it does for males. However, there are certain combinations that seem to be effective with both male and female students, viz., the I II III (Low to High) and I II II (Low to Moderate) combinations. The III I II (High-Low-Moderate) and II III III (Moderate to High) combinations were especially ineffective for both sexes. In the two poor or ineffective combinations of intensities the High intensity stimulus either occurred first or as a plurality.

Effects of order of presentation on learning

As can be seen in Table 3, there is a strong order effect for males. The Mixed order was most effective, followed by the After order and the Before order, with mean per cent correct responses of 82.9%, 77.6%, and 71.2%, respectively. A t-test comparing the means for the Before and After orders had a value that would occur less than 1 time in 10 by chance -- not a powerful difference, but one indicative of a psychological effect.

Table 6 presents the data on order for all conditions. In all comparisons (8 out of 8) the placement of the story following the relevant learning material was more effective than placing it before, a finding that contradicted our expectations. This finding was sharpest for boys on the delayed emergency test.

The Mixed order of presentation was consistently superior for the boys in both the Before and After conditions, a difference which reached significance for the comparison of the Mixed to the Before condition, and again was sharpest for the emergency test.

A breakdown of the Mixed order of presentation into its component groups is given in Table 7. These results indicate the sharp differences between the boys and girls in the effect of this variable. For the boys the alternating order AB AB AB is clearly less effective than either the A A A B B B order or its reverse. This result seems partly due to the increased effectiveness of the After order and the decreased effectiveness of alternating orders. For the girls, however, the alternating order AB AB AB produced consistently higher learning scores.

Effects of Manifest Anxiety

Taylor Manifest Anxiety tests were administered at the outset of the study, partly as a control measure, to be able to demonstrate comparability of treatment groups on level of manifest anxiety. However, there is a real possibility that the retention of individuals scoring high and low on the anxiety test is affected quite differently by the emotional stimuli.

Specifically, partial correlational coefficients were computed to determine the extent of the relationship between manifest anxiety and retention of the emergency content, with previous driver knowledge (as assessed by the Driver Knowledge Test) held constant. These coefficients are given in Table 8 for each of the Low, Moderate, and High intensity groups.

TABLE 8
PARTIAL CORRELATION COEFFICIENTS BETWEEN
MANIFEST ANXIETY AND EMERGENCY INFORMATION SCORES

		<u>Intensity Group</u>		
		<u>Low</u>	<u>Moderate</u>	<u>High</u>
Males	<u>N</u>	25	24	27
	<u>r</u>	.40	.02	-.12
Females	<u>N</u>	25	25	22
	<u>r</u>	-.05	.30	.26

TABLE 6

COMPARISONS OF GROUPS RECEIVING DIFFERENT ORDERS OF PRESENTATION
(After (A) and Before (B)) FOR MALES, FEMALES, AND SEXES COMBINED
ON THE ROUTINE (Rou) AND EMERGENCY (Emr) SECTIONS OF THE
IMMEDIATE (I) AND DELAYED (II) TESTS

Comparison	MALES			FEMALES		
	Means (N)	Diff.	P	Means (N)	Diff.	P
<u>Mixed - All-A</u>	<u>Mixed - All-A</u>			<u>Mixed - All-A</u>		
Rou I	37.1 (33) - 35.3 (39)	1.8	-	34.2 (39) - 34.7 (32)	-0.5	-
Rou II	37.7 (31) - 36.3 (37)	1.4	-	33.4 (37) - 35.9 (32)	-2.5	<.10
Emr I	38.3 (33) - 36.3 (36)	2.0	-	35.5 (38) - 35.5 (32)	0.0	-
Emr II	39.0 (31) - 36.5 (37)	2.5	<.10	34.3 (34) - 34.5 (30)	-0.2	-
<u>Mixed - All-B</u>	<u>Mixed - All-B</u>			<u>Mixed - All-B</u>		
Rou I	37.1 (33) - 35.1 (34)	2.0	<.10	34.2 (39) - 34.7 (35)	-0.5	-
Rou II	37.7 (31) - 35.3 (33)	2.4	<.10	33.4 (37) - 33.8 (33)	-0.4	-
Emr I	38.3 (33) - 33.5 (31)	4.8	<.05	33.5 (38) - 35.0 (35)	0.5	-
Emr II	39.0 (31) - 33.5 (31)	5.5	<.005	34.3 (34) - 34.4 (31)	-0.1	-
<u>All-A - All-B</u>	<u>All-A - All-B</u>			<u>All-A - All-B</u>		
Rou I	35.3 (39) - 35.1 (34)	0.2	-	34.7 (32) - 34.7 (35)	0.0	-
Rou II	36.3 (37) - 35.3 (33)	1.0	-	35.9 (32) - 33.8 (33)	2.1	-
Emr I	36.3 (36) - 33.5 (31)	2.8	-	35.5 (32) - 35.0 (35)	0.5	-
Emr II	36.5 (37) - 33.5 (31)	3.0	<.05	34.5 (30) - 34.4 (31)	0.1	-
Rou I	SD = 4.56			SD = 4.55		
Rou II	SD = 5.37			SD = 5.00		
Emr I	SD = 6.96			SD = 6.22		
Emr II	SD = 6.09			SD = 6.14		

TABLE 7

COMPARISONS OF SUB-GROUPS RECEIVING DIFFERENT COMBINATIONS OF THE MIXED ORDER OF PRESENTATION FOR MALES, FEMALES, AND SEXES COMBINED ON THE ROUTINE (Rou) AND EMERGENCY (Emr) SECTIONS OF THE IMMEDIATE (I) AND DELAYED (II) TESTS

	MALES			FEMALES		
Comparison	Means (N)	Diff.	p	Means (N)	Diff.	p
<u>AAA BBB - ABA BAB</u>	<u>AAA BBB - ABA BAB</u>			<u>AAA BBB - ABA BAB</u>		
Rou I	40.0 (10) - 35.1 (13)	4.9	<.01	32.6 (14) - 36.0 (11)	-3.4	<.10
Rou II	41.1 (10) - 34.3 (12)	6.8	<.005	33.5 (13) - 33.5 (11)	0.0	-
Emr I	40.8 (10) - 35.2 (13)	5.6	<.05	35.0 (14) - 37.5 (10)	-2.5	-
Emr II	41.7 (10) - 35.7 (12)	6.0	<.01	33.3 (12) - 36.1 (10)	-2.8	-
<u>BPB AAA - ABA BAB</u>	<u>BBB AAA - ABA BAB</u>			<u>BBB AAA - ABA BAB</u>		
Rou I	36.8 (10) - 35.1 (13)	1.7	-	34.2 (14) - 36.0 (11)	-1.8	-
Rou II	38.4 (9) - 34.3 (12)	4.1	<.10	33.2 (13) - 33.5 (11)	-0.3	-
Emr I	39.7 (10) - 35.2 (13)	4.5	<.05	34.5 (14) - 37.5 (10)	-3.0	-
Emr II	40.4 (9) - 35.7 (12)	4.7	<.05	33.7 (12) - 36.1 (10)	-2.4	-
<u>AAA BBB - BBB AAA</u>	<u>AAA BBB - BBB AAA</u>			<u>AAA BBB - BBB AAA</u>		
Rou I	40.0 (10) - 36.8 (10)	3.2	<.10	32.6 (14) - 34.2 (14)	-1.6	-
Rou II	41.1 (10) - 38.4 (9)	2.7	-	33.5 (13) - 33.2 (13)	0.3	-
Emr I	40.8 (10) - 39.7 (10)	1.1	-	35.0 (14) - 34.5 (14)	0.5	-
Emr II	41.7 (10) - 40.4 (9)	1.3	-	33.3 (12) - 33.7 (12)	-0.4	-
Rou I	SD = 3.99			SD = 4.17		
Rou II	SD = 4.74			SD = 4.94		
Emr I	SD = 4.89			SD = 5.99		
Emr II	SD = 4.42			SD = 5.75		

There appears to be a reverse tendency of the effect by sex, the correlation being stronger under Low threat for males, under High threat for females. However, the differences between the correlational coefficients did not reach a statistically significant level in the case of any two groups.

2.4 DISCUSSION OF RESULTS

A discussion of the results of Experiment I will proceed in view of the findings of related research. Because of the rather unusual interaction effects found in Experiment I -- those of the main variables with time, with the nature of the material to be learned or content type, and with sex of the student -- the review of the interaction effects will precede the review of the main effects.

Interaction Effects

Time. It was observed that the main effects did not diminish with time, but, if anything, became more pronounced. Both the order effect for males and the intensity effect for females were sharper (reaching significance in the case of females) on the delayed tests. Whether the delayed effect persisted or is statistically reliable is not answerable at this time. Since it is the reverse of the typical finding (the effect of a variable being immediately apparent, but decreasing over time), there exists no closely related research to substantiate this finding.

Traditional learning theory would postulate a gradual extinction of the effect of a particular reinforcing stimulus on a set of responses, unless the set of responses were continually associated with the reinforcing stimulus. However, Hovland, et. al. (1949), studying the effects of certain variables on opinion changes, found a large number of effects which persisted for long periods of time and actually increased in magnitude. Calling this phenomenon a "sleeper effect," they offered a number of possible explanations which had to do with factors outside the experimental situation acting to reinforce what was presented experimentally.

Nature of learning materials. A second important interaction was that of the main effects with the learning content. The two principal independent variables influenced retention of the emergency driving material, but not the information having to do with routine driving procedures. Since it may be presumed that, in contrast to the routine driving procedures, the emergency tactics are inherently more unique and stimulating, it might be expected that the emotional stimulus variables would interact more effectively with the latter. Learning how to handle a blow-out or a skid, for example, is less tedious than learning parking regulations and rules of the road.

Another consideration is the credibility that the material lends the emotional stimulus. Ordinary driving procedures which occur with high frequency in everyday life are not normally associated with accidents and other negative outcomes. When the material deals with driving techniques which are employed in dangerous situations, however, the credibility of the story depicting an adverse outcome is increased.

Sex. The effectiveness of various levels of intensity of emotional stimulation for females, in general, corresponded to that for males. That the emotional content should have a more dramatic effect on the learning of females is not at variance with common notions of the amenability of females to emotionally loaded communications and to more sympathetic or empathic responding. Thus, whereas males may manifest a culturally determined resistance to materials designed to elicit an emotional response, females should show no such resistance.

The most outstanding sex difference concerns the effectiveness of the Mixed intensities treatment. There is no ready answer as to why this should be the most effective treatment for females, least effective for males. One possibility is that the male Mixed intensities group was an exceptionally poor group of learners, though this would be an unusual contingency where individuals were randomly assigned to treatment groups.* Another possibility, even less likely, is that the absence of stereotypy of intensity level in the Mixed treatment affects credibility differently for males and females.

Main Effects of Emotional Content Variables

The effect of intensity of fear-arousing stimulation. The data presented herein on the effect of degree of threat on learning and retention are generally consistent with findings bearing on attitude change. In a pair of studies conducted by Janis and Feshbach (1953), and Janis and Terwilliger (1962), degree of threat in persuasive communications on health practices was varied, and the effect on learning and acceptance of the relevant information was determined. Although degree of threat had no influence on the learning of oral hygiene recommendations, the strong threat was less effective than the mild threat in inducing people to conform to the recommended practices. Nearly identical results were found when the content of the communication focused on the pernicious results of smoking.

However, an elaboration of the Janis and Feshbach experiment, reported by Snider (1963), shows contrary results. Using communications on smoking and lung cancer, Snider found more attitude change associated with high threat than with low threat.

The relationship between degree of arousal, and efficiency of performance (i.e., motivation to learn, remember, or change one's attitude) is described by Berlyne (1960, p. 50) as an inverted U-shaped function. It follows that to be maximally effective, the emotional stimulus must be neither very mild nor very excitatory, but of "moderate" intensity. Theoretically, then, a strong-threat communication would be too highly arousing, producing inhibiting effects due to anxiety interference and subsequent repression of associated materials. A very mild intensity stimulus, at the other extreme, might be little more provocative than no stimulation at all, and would not affect motivation. This is not to say that experimental results suggesting good efficiency with a "low" or "mild" intensity stimulus are at odds with

*Note: Although the differences were not statistically reliable, the mixed intensities group of males also scored lowest of all male intensity groups on the Driver Knowledge Test. This, by no means conclusive, lends credence to the possibility that this group had less learning potential from the outset.

Berlyne's formulation. These results may mean simply that the experimenters have failed to isolate a true low-intensity treatment (or in the case of Snider's study a true high-intensity treatment), and that what they have labeled as "low" or "mild" may on a theoretical continuum be in the moderate range of stimulation.

The effect of order of threatening communication. The clearest result stemming from data on the Order variable is that an emotional stimulus following the relevant material is more likely to be effective than one preceding it, when one is dealing with male subjects. This trend holds true for males in all Intensity level groups. There exists some confusion regarding the effect of a mixed ordering of stimuli, and supplemental data is needed to clarify the present findings.

The efficacy of placing the emotional stimulus after the learning sequence is logical if it is assumed that the stimulus is emotionally arousing, and that the arousal would interfere with learning were it placed before the sequence. Also, it can be argued that the learner is better able to cope--symbolically--with the aversive consequences described in the communication when he has learned the driving procedures enabling him to avoid similar consequences in his own driving.

However, one is made to wonder at the mechanism of this motivating force. How can arousal affect learning if the individual is aroused only after he has learned? How can the emotional stimulus, relevant or not, act retrospectively to motivate learning? The answer may be that the emotional stimulus is anticipated by the learner. He is exposed not to one, but to a series of six emotional stimuli. Where the ordering is fairly consistent, he comes to expect an insert following certain of the learning units. When in fact the sequence is followed by an emotional insert, the learning is reinforced by the student's being able to cope (again, symbolically) with the threatening situation described in the story. If, then an emotional stimulus placed after a learning unit works to reinforce the learning, it would determine what material should be remembered, and what material is less important.

The power of this emphasizing effect has been well recognized in a series of experiments by Muenzinger and his associates (1934, 1935, 1938, 1952). Muenzinger's experiments showed that aversive stimulation such as electric shock and obstacles to overcome, even when following correct responses, aid learning. A tenable hypothesis is that the emotional stimuli, following the learning units, are operating similarly.

2.5 SUMMARY OF FINDINGS, EXPERIMENT I

Significant main effects were found on the delayed Final Examination scores for that half of the test having to do with emergency driving procedures. For the male students there was a reliable Order effect; that is, the placement of the emotional inserts, whether before the learning unit, after it, or a mixture of before and after placements, affected retention differentially. A breakdown of

the Mixed order into its component sub-order treatments showed the overall superiority of the Mixed order to be a spurious finding. The After order was superior to the Before order for males.

For females there was no significant Order effect, but a breakdown of the Mixed order revealed a trend toward superiority of the mixed sub-order (BAB).

Level of Intensity of emotional stimulation appeared as a statistically reliable main effect in the data for females. The Mixed intensities treatment was most effective, being significantly better than the Control treatment. The Low and Moderate intensity treatments also led to better retention, while the High intensity treatment was less effective than the Control treatment.

The data for males on Intensity of emotional stimuli generally support what was found for females, only the main effect for males is not significant. An emphatic sex difference was found under the Mixed intensities treatment, it being least effective for males and most effective for females.

The first experiment has demonstrated:

(1) The feasibility and desirability of the use of programmed instruction together with written emotional inserts as a methodological medium for the study of emotionality and learning. The materials readily fit the context of a driver education course, are efficient for short terms of instruction and simple to administer, and above all can be manipulated to the experimenter's end with the precision and control of the laboratory technique.

(2) That the inclusion of suitably arranged emotional content in an instructional program can result in learning which is superior to that occurring in the absence of emotional content.

(3) Positive findings on the effects of the two major independent variables, intensity of emotional stimulus and temporal position of emotional stimulus.

III. EXPERIMENT II

The second experiment in the emotional content study attempted to cross-validate and extend the strongest findings of the first experiment. The replication involved only those experimental conditions which appeared to be productive of significant effects in the first experiment. Since no meaningful differences in aroused emotion or retention were found between the low and moderate threat groups, only a low and a high threat condition were used in the replication. A second change dealt with the difference associated with the content of the learning materials. Both routine and emergency learning materials were used in the first experiment. Since the routine materials did not yield differences between any treatment groups, only emergency materials were used in the replication. The advantage of these eliminations was that it became possible to have a larger number of subjects in the remaining cells.

In addition to cross-validating the previous study, the present experiment was designed to obtain information on some related effects of threat and individual differences in susceptibility to fear arousal. Further information was sought in the following areas:

Arousal of emotional responses. Our previous data indicated that the experimentally manipulated levels of threat produced differences in the subjects' affective response, as measured by an adjective rating scale. A more intensive study of these emotional responses was made in the second experiment. One measure was concerned with ascertaining whether differences in emotional tension were successfully instigated to the specific material mentioned by the case-studies. An additional measure was designed to investigate generalization of emotional responses to other potentially dangerous driving situations mentioned in the training material, but for which no threatening material was given in the course.

Credibility of the emotional stories. Motivation to learn the proper procedures to avoid an accident cannot be induced, no matter how threatening the consequences of such an accident, if the student does not, in fact, believe that such an accident could happen to him personally. To obtain an estimate of the credibility of the emotional stories, a rating of the estimated likelihood of personal involvement in the kind of accident depicted was obtained for each case-study. This rating indicated whether both the low and high threat case-studies were perceived as equally credible by the subjects, or if differences in credibility occurred, with possible differences in resulting motivation.

Acceptance-rejection of the communications. It has often been found that when subjects are exposed to anxiety-arousing communications, they will occasionally react to the unpleasant experience by becoming aggressive. In this case, the aggression might take the form of rejection of the programmed material and the presentation of the course by the students (Janis & Feshbach, 1954). One of the objectives of this study was to obtain information on the general level of acceptance of the material, as well as the effects of threat on the acceptance-rejection of the programmed material and the course itself.

Reassurance associated with the recommended safety practices. If a communication is successful in arousing intense emotional tension, the practices recommended in the communication may be seen as inadequate to avoid the dangers depicted in the communication. Different degrees of reassurance might be expected to result from different amounts of emotional tension generated by the threat material. The present experiment proposed to investigate these differences, as well as to obtain data on the general level of reassurance developed by the recommended practices in the programmed material.

Individual motivation to avoid physical harm: The first experiment used a measure of manifest anxiety in order to investigate the interaction of threat

material and neurotic anxiety on the retention of safe driving practices. These results showed no differences in retention as a result of neurotic anxiety level. This finding led to the hypothesis that the type of existing motivation within the person which interacts with the threat material must be more specific; namely, a concern with avoiding physical danger. A measure of physical anxiety was used to investigate its interacting effect with threat on the retention of the safe driving practices.

In sum, the second experiment served not only to cross-validate the major findings of our first study, but also to further increase our knowledge of some of the effects of threat material and their interactions with existing motives.

3.1 METHOD

The experiment was designed to provide: (1) measures of the effects of two different intensities of "fear arousal" in a programmed course of safe driving practices; (2) measures of the differential effects of fear-appeal material as a result of placement before or after the learning materials of the course; and (3) measures of the effects of fear-appeal material interacting with certain subject variables, such as physical anxiety.

The experimental program

The learning material for Experiment II consisted of seven chapters of information on safe driving practices presented in two class periods. The two manuals dealt specifically with emergency driving procedures, such as appropriate responses to loss of foot brakes.

The emotionally-toned stories consisted of two or three paragraphs depicting drivers in potentially dangerous traffic situations. The stories were followed by program frames which required the student to respond to the content of the stories. The number of frames following the story was generally consistent with and proportional to the number of frames in the learning unit, the ratio being 1 : 6.

There were three such emotional inserts. The theme of the stories was always cue-relevant; that is, the driver in the story failed to execute one or more of the safe driving principles taught in the corresponding chapter.

The emotional intensity of each case study could be varied by fitting each story stem with one of two possible endings describing the outcome of

the incident. Low level intensity endings (called Moderate in the first experiment) depicted an accident with some property damage or an arrest, but no personal injury. However, the High level endings reported an accident in which someone was seriously hurt or killed, with the injuries being described in vivid, concrete terms.

A sample case study with its two endings of different intensity can be seen in Table 9. All case studies were constructed to allow their placement either Before or After the chapter to which they corresponded.

Experimental Design

The design of Experiment II had two levels of intensity and two placement orders. The intensity conditions were: control - this group had no emotional inserts in their programmed manuals; Low intensity level - all three inserts with low endings; High intensity level - all three inserts with highly emotional endings.

Two orders for the emotional intensity material were included in the present design and were as follows: Before - all three emotional inserts directly preceded their correspondent chapters; and After - the three inserts directly followed their correspondent chapters.

The following matrix shows the basic design of the experiment:

<u>Placement of Emotional Material</u>	<u>Emotional Intensity</u>	
	<u>Low (I)</u>	<u>High (II)</u>
	<u>Before (B)</u>	<u>After (A)</u>
	Group I B	Group II B
	Group I A	Group II A

In addition to the above treatment groups, a control group (Group C) was included in the study. This group received only the factual safe driving material and no emotional material was included.

Subjects

The subjects for the present study consisted of the entire ninth grade driver education population of the Falls Church High School, Falls Church, Virginia. Thirty-three female subjects were randomly assigned to each of the four treatment groups and sixty-six to the control group. Similarly, twenty-eight male subjects were randomly assigned to each of the four treatment groups and fifty-six to the control group. All treatments were replicated within each class since class assignment is often on the basis of scholastic ability. Total N for the study was 366.

All treatment groups, including the control group, were given a Driver Knowledge Test and an Attitude toward Safe Driving Practices Survey as pre-tests to insure equivalence between the treatment groups in driving knowledge and attitude toward safe driving practices.

TABLE 9

SAMPLE CASE-STUDY WITH LOW AND HIGH EMOTIONAL INTENSITY ENDINGS

Case-Study Stem

Edward Groggins, a typesetter for a newspaper, drove from his home to the newspaper office each working day, a round-trip distance of 24 miles. The route between his home and the town was almost all downhill, and he had to travel on narrow, winding mountain roads for a good part of the trip.

On this particular morning Groggins took his wife with him on the trip to town, since she had some shopping to do. As they were approaching a straight stretch of road that ended in a sharp curve and a steep downgrade, Groggins tested his brakes. They were not holding, and the brake pedal went nearly all the way to the floor.

Low Emotional Intensity Ending

He pushed down the brake pedal again and again, but the brakes would not hold. The car began picking up speed as it headed toward the curve. Groggins could not steer the car around the curve without his brakes, and the car went off the road into a group of small trees. Neither Groggins nor his wife was hurt.

High Emotional Intensity Ending

He frantically pushed down the brake pedal again and again, but the brakes would not hold. The car began picking up speed as it headed toward the curve. Groggins could not steer the car around the curve without his brakes, and the car shot off the road at high speed and crashed into a large aspen tree. Groggins' wife was thrown through the windshield by the impact. As a result her face was terribly scarred. Groggins' right hand was so badly crushed that he did not regain the use of any of his fingers.

The analysis of variance for the knowledge data, Table 10a, shows the five treatment groups for each sex to be equivalent in driving knowledge prior to the programmed course. However, as expected there was a highly significant sex difference ($p < .005$). The boys showed significantly greater knowledge of correct driving practices than did the girls. This difference can be seen in Table 10b, which shows the mean for each treatment group separately, and in Table 10c, which shows the means for the groups combined according to level of threat material received and placement of the material.

TABLE 10a
ANALYSIS OF VARIANCE FOR PRE-TREATMENT
DRIVER KNOWLEDGE TEST SCORES

Source	df	SS	MSS	F
Treatments	4	4.48	1.12	.18
Sex	1	236.06	236.06	38.18***
T x S	4	16.44	4.11	.66
Error	356	2200.96	6.18	
Total	365	2457.96		

*** $p < .01$

TABLE 10b
MEAN PRE-TREATMENT SCORES ON DRIVING KNOWLEDGE TEST
BY TREATMENT GROUPS

	Treatment Groups				
	LOW		HIGH		CONTROL
	Intensity	Placement	After	Before	
MALES			15.64	15.07	15.36
FEMALES			13.64	14.33	13.73

TABLE 10c

MEAN PRE-TREATMENT SCORES ON DRIVER KNOWLEDGE TEST
BY TREATMENT VARIABLES

	<u>Treatment Variables</u>				
	<u>Intensity</u>		<u>Placement</u>		<u>Control</u>
	LOW	HIGH	AFTER	BEFORE	
MALES	15.36	15.69	15.66	15.39	15.36
FEMALES	13.98	13.86	13.83	14.01	13.73

The attitude scale showed the five treatment groups for each sex to be equivalent in attitudes toward safe driving practices. In this case only a slight indication of a sex difference was found to exist ($p < .25$). These findings are shown in the analysis of variance, Table 11a, and in the table of means, 11b.

TABLE 11a

ANALYSIS OF VARIANCE FOR PRE-TREATMENT
ATTITUDE TOWARD SAFETY PRACTICES SURVEY SCORES

Source	df	SS	MS	F
Treatments	4	264.90	66.22	.57
Sex	1	196.65	196.65	1.69
T x S	4	398.76	99.69	.86
Error	356	41208.90	115.75	
Total	365	42069.21		

TABLE 11b
MEAN PRE-TREATMENT SCORES ON
ATTITUDE TOWARD SAFETY PRACTICES BY TREATMENT VARIABLES

	<u>Treatment Variables</u>				
	<u>Intensity</u>		<u>Placement</u>		<u>Control</u>
	LOW	HIGH	AFTER	BEFORE	
MALES	33.84	31.51	33.62	31.73	32.77
FEMALES	31.00	30.60	29.83	31.77	31.95

NOTE: The lower the score, the better the attitude

Thus, prior to the beginning of the experiment all treatment groups for each sex (including the control) were equivalent in driving knowledge and attitude toward safe driving practices.

Administration of the Experimental program

Prior to starting the learning program the subjects took the twenty-item Driver Knowledge Test, the Attitude toward Safe Driving Practices Survey, and the Physical Anxiety Scale. In the following two 55-minute class periods the subjects completed the two programmed manuals. After finishing the second manual, subjects not in the Control condition filled out the Semantic Differential Scales, making ratings of the subjective intensities of the inserts they had read. Then all the subjects filled out the following questionnaires: (1) a Dangerous Driving Situations questionnaire, used to provide data on the amount of generalized aroused concern the programmed and emotional materials produced; (2) Post-Attitude Survey, an equivalent form of the Pre-Attitude Survey; (3) a twenty-six question Final Examination, using only those items that an item analysis of the Final Examination used in the first experiment showed to be discriminating; and (4) a Course Evaluation Questionnaire, used to obtain information on the general level of acceptance of the experimental program, as well as differences in the acceptance-rejection of the material as a result of different amounts of fear arousal. This last questionnaire also provided information on the extent to which the subjects in the various treatment groups felt adequately prepared to meet dangerous driving situations as a result of having learned the programmed material.

One month later, the Final Examination was again administered to all subjects in order to ascertain the carry-over effects of the programmed learning material. The Appendix contains copies of all the questionnaires mentioned in this section.

Analysis of Variance for Experiment II

The analysis of variance design planned for the second experiment was a five x two factorial Design, Model I (fixed factor), completely randomized design (Snedecor, 1957)

This may be written as follows:

$$X_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + e_{ijk}$$

$$i = 1, 2, \dots, 5$$

$$j = 1, 2$$

$$e_{ijk} = N(0, \sigma^2)$$

TABLE 12a

Model I (fixed factor)
Completely Randomized Design
where μ = overall effect

Source	df	SS	MS	F
Treatments	10	236.10	23.61	10.17
Sex	1	10.17	10.17	4.41
T x S	2	10.17	5.08	2.21
Error	236	1017.10	4.31	
Total	246	1243.20		

α = treatment effect

$(\alpha\beta)_{ij}$ = interaction effect

$e_{ijk} = N(0, \sigma^2)$ which is sampling error

normally distributed with mean 0

and variance σ^2

The five by two factorial design means two factors, one at five levels, and one at two levels. Treatments encompassed two threat and two position levels, plus control. The analysis allowed us to determine if there were any treatment and/or sex differences.

Before analyzing the data, it was checked for homogeneity of variance, and the variances were found to be homogeneous.

3.2 RESULTS

Affective Reactions

Evidence for the amount of emotional tension aroused by the case-studies was obtained immediately after completion of both manuals. All subjects (excluding those in the control group) were given the stems for the three case-studies and asked to rate them on four bi-polar adjectives (Bad-Good, Terrible-Wonderful, Worried-Carefree, Awful-Nice). Since the stems of the case-studies were devoid of the emotional material, all subjects were rating on the basis of their memory of the threatening incidents. Furthermore, to insure that the subjects read the questions carefully and did not follow any set, the order of the questions and their polarity was randomized for each case-study. In order

to obtain an overall measure of the emotional tension aroused by the case-studies, the scores were summed and combined for all three case-studies.

Evidence that the two forms of threat (Low and High) differed with respect to the amount of emotional response evoked by the case-studies is presented in analysis of variance Table 12a. This table shows a highly significant difference in the amount of specific concern aroused in the subjects of each sex by the high and low threat case studies. Examination of the means for the threat material, Table 12b, shows that for both the boys and girls, significantly more emotional tension was evoked by the high threat case-studies than by the low threat ones. This indicates successful manipulation of the emotional intensity variable in the arousal of concern. A study of the means for the placement of the emotional material, Before or After, shows that no real differences in aroused concern occurred as a result of placement of the case-study material.

TABLE 12a

ANALYSIS OF VARIANCE FOR CASE-STUDY EMOTIONAL RESPONSE SCORES

Source	df	SS	MSS	F
Treatments	3.	1911.82	637.27	14.43***
Sex	1	860.43	860.43	19.48***
T x S	3	222.60	74.20	1.68
Error	236	10421.89	44.16	
Total	243	13416.74		

*** $p < .01$

TABLE 12b

MEAN EMOTIONAL RESPONSE SCORES FOR CASE-STUDY QUESTIONNAIRE
BY TREATMENT VARIABLES

	<u>Treatment Variables</u>			
	<u>Intensity</u>		<u>Placement</u>	
	LOW	HIGH	AFTER	BEFORE
MALES	29.07	22.07	26.00	24.93
FEMALES	23.96	19.63	21.10	22.50

NOTE: the lower the score, the greater the emotional response

Evidence on the generalization of this emotional response to the case-study material to the more factual parts of the program for which no emotional material was given was obtained. After completing the programmed course, all subjects, including controls, were given the Driving Situations Questionnaire. This questionnaire consisted of fourteen statements of driving situations mentioned in the programmed course, and the subjects were asked to rate them on perceived danger. Each statement was followed by a checklist of five categories ranging from "Not Dangerous" to "Extremely Dangerous." In order to get an overall measure of emotional response, the scores for each item were summed to form a total score for each subject.

There is a strong indication that differences in generalized emotional tension existed between the treatment groups ($p < .025$). This is shown in Table 13a.

A significant interaction was found to exist between treatment and sex, indicating that threat and sex in this case are not independent. Examination of the threat intensity means, Table 13b, given evidence that the high threat group perceived the situations as more dangerous than did the low threat group, and that the low threat group perceived them as more dangerous than the control group did.

TABLE 13a

ANALYSIS OF VARIANCE OF DANGEROUS DRIVING SITUATIONS SCORES

Source	df	SS	MSS	F
Treatments	4	586.30	146.57	3.26**
Sex	1	17.30	17.30	.38
T x S	4	447.40	111.85	2.49*
Error	356	15966.70	44.85	
Total	365	17017.70		

* $p < .05$

** $p < .025$

TABLE 13b

MEAN EMOTIONAL RESPONSE SCORES FOR DANGEROUS DRIVING SITUATIONS
SCORES BY TREATMENT VARIABLES

	Intensity		Treatment Variables		
	LOW	HIGH	Placement AFTER	BEFORE	Control
MALES	52.71	53.23	51.17	54.87	51.91
FEMALES	52.46	55.09	54.13	53.42	51.71

NOTE: The higher the score, the greater the estimated danger

Credibility

After completing the program, subjects (excluding the control group) were asked to complete a bi-polar adjective rating for each of the three case-studies. This served to indicate their estimate of the likelihood of personal involvement in the type of accident depicted in each case study. The five point scale ranged from "Fairly High" to "Very Low" and in order to obtain an overall measure of credibility of the case-studies, the scores for all three were summed to form a total score.

No significant differences in the credibility of the accidents were found between the Low and High threat groups of each sex, as shown in Table 14a. Examination of the means for the treatment groups, Table 14b, shows both the boys and girls thought the accidents to have an average likelihood of occurring to them.

TABLE 14a

ANALYSIS OF VARIANCE FOR CREDIBILITY SCORES

Source	df	SS	MSS	F
Treatments	3	1.18	.39	.06
Sex	1	78.65	78.65	13.50***
T x S	3	16.56	5.52	.94
Error	236	1374.16	5.82	
Total	243	1470.55		

*** $p < .01$

TABLE 14b

MEAN SCORES FOR CREDIBILITY RATINGS BY TREATMENT VARIABLES

	<u>Treatment Variables</u>			
	<u>Intensity</u>		<u>Placement</u>	
	LOW	HIGH	AFTER	BEFORE
MALES	8.66	8.17	8.32	8.51
FEMALES	7.16	7.39	7.36	7.19

NOTE: The lower the score, the more perceived credibility

Acceptance-Rejection of the Communications

All other aspects of the course were completed and the subjects were asked to fill out a Course Evaluation Questionnaire which gave information on their receptiveness to the programmed material, and the course as a whole. This part of the questionnaire contained seven items in which the students were asked to give their appraisal of the course. In a school situation, students may be hesitant to evaluate a course. Therefore, for each statement, no intermediate choices were included. The students were simply asked to state whether they agreed or disagreed with the statements. To prevent the students from following a set, the polarity of the items was varied. A total score was computed for each subject.

Analysis of variance Table 15a shows that no significant differences were found to exist in the acceptance of the programmed material by any of the experimental groups. However, an examination of the means for the intensity variable, Table 15b, gives a slight indication that the control group was more receptive to the material than the low threat group, with the high threat group being the least receptive of all the groups. A further examination of the intensity means shows that all groups indicated relatively high level of acceptance of the programmed material, indicating that the material was viewed as well presented, interesting, and enjoyable.

TABLE 15a

ANALYSIS OF VARIANCE OF ACCEPTANCE-REJECTION SCORES ON COURSE EVALUATION QUESTIONNAIRE

Source	df	SS	MSS	F
Treatments	4	7.58	1.89	.52
Sex	1	1.88	1.88	.51
T x S	4	14.58	3.64	1.00
Error	356	1289.43	3.62	
Total	365	1313.49		

TABLE 15b

MEAN SCORES FOR ACCEPTANCE-REJECTION OF THE COMMUNICATIONS ON THE COURSE EVALUATION QUESTIONNAIRE BY TREATMENT VARIABLES

	<u>Intensity</u>		<u>Treatment variables</u>		<u>Control</u>
	<u>LOW</u>	<u>HIGH</u>	<u>Placement</u>	<u>BEFORE</u>	
			<u>AFTER</u>		
MALES	8.92	8.67	8.98	8.62	9.14
FEMALES	8.78	8.71	8.48	9.02	8.82

NOTE: the higher the score, the greater the acceptance of the material

Acquisition of Knowledge

Immediately upon the completion of the programmed material, each experimental group was given the Driving Knowledge Test consisting of twenty-six separate multiple-choice items. These items were based specifically on the pertinent safe driving practices material which the students were to learn in the programmed manuals.

The Analysis of Variance for this data, Table 16a, shows no significant differences in retention of the safe driving practices by any of the experimental groups. The Table of Intensity Means, 16b, suggests that the boys in the low threat group did slightly better than the boys in the high threat group, but that the reverse occurred with the girls. Furthermore, the means for the placement of the material indicates that the boys who received the threat material Before the learning material did slightly better than those who received the threat After the learning material; again, this was reversed for the girls.

TABLE 16a

ANALYSIS OF VARIANCE FOR IMMEDIATE POST-TREATMENT DRIVER KNOWLEDGE SCORES

Source	df	SS	MSS	F
Treatments	4	43.01	10.75	.57
Sex	1	104.82	104.82	5.64**
T x S	4	76.65	19.16	1.03
Error	356	6607.03	18.55	
Total	365	6831.51		

** p < .025

TABLE 16b

MEAN SCORES ON IMMEDIATE POST-TREATMENT DRIVER KNOWLEDGE TEST BY TREATMENT VARIABLES

	<u>Treatment Variables</u>				
	<u>Intensity</u>		<u>Placement</u>		<u>Control</u>
	LOW	HIGH	AFTER	BEFORE	
MALES	19.57	18.96	19.21	19.32	18.93
FEMALES	18.13	18.59	18.77	17.95	17.52

In order to ascertain the carry-over effects of our programmed learning course, the same twenty-six item final examination given immediately after the completion of the course was again taken by the subjects one month later. Again, the Analysis of Variance, Table 17a, showed no significant difference in the retention of the safe driving practices by any of the experimental groups. By looking at the Table of Means for Intensity and Placement, 17b, it can be seen that the exact pattern found in the immediate final examination held up for the delayed final examination.

Comparison of the means for the immediate final examination and the delayed final examination gives evidence of the extremely high carry-over effects in the retention of the safe driving practices learned in the programmed course.

TABLE 17a

ANALYSIS OF VARIANCE OF DELAYED (one-month)
DRIVER KNOWLEDGE TEST SCORES

Source	df	SS	MSS	F
Treatments	4	13.03	3.25	.19
Sex	1	178.38	178.38	10.85***
T x S	4	64.09	16.02	.97
Error	356	5851.83	16.43	
Total	365	6107.33		

*** $p < .01$

TABLE 17b

MEAN SCORES ON DELAYED (one-month) DRIVER KNOWLEDGE TEST
BY TREATMENT VARIABLES

	<u>Treatment Variables</u>				
	<u>Intensity</u>		<u>Placement</u>		<u>Control</u>
	LOW	HIGH	AFTER	BEFORE	
MALES	19.32	19.14	19.17	19.28	19.38
FEMALES	17.64	18.38	18.32	17.70	17.62

Reassurance associated with the recommended safety practices

A part of the Course Evaluation Questionnaire and the post-Attitude toward Safe Driving Practices Scale were used to measure the subject's perception of the helpfulness of the recommended safe driving practices in handling and avoiding emergency driving situations. Specifically, in the five items of the Course Evaluation Questionnaire the students were asked to express how adequately they felt the programmed material had prepared them for handling dangerous driving situations. These items gave information on the general level of reassurance provided by the programmed material and whether differences in reassurance developed as a result of the presentation of different degrees of emotional intensity material.

The Analysis of Variance of this Course Evaluation Questionnaire, Table 18a, gives an indication ($p < .025$) that there was difference in the amount of reassurance provided by safe driving practices for students of the different experimental groups. Examination of the Table of Means, 18b, shows an indication that, as expected, the low threat groups for both sexes felt more adequately prepared than those in the high threat group. The control group felt the least adequately prepared.

TABLE 18a

ANALYSIS OF VARIANCE OF THE REASSURANCE SCORES
OF THE COURSE EVALUATION QUESTIONNAIRE ITEMS

Source	df	SS	MSS	F
Treatments	4	6.77	1.69	1.39
Sex	1	.25	.25	.20
T x S	4	5.45	1.36	1.12
Error	356	431.05	1.21	
Total	365	443.54		

TABLE 18b

MEAN REASSURANCE SCORES FOR THE
COURSE EVALUATION QUESTIONNAIRE BY TREATMENT VARIABLES

	<u>Treatment Variables</u>				
	<u>Intensity</u>		<u>Placement</u>		<u>Control</u>
	LOW	HIGH	AFTER	BEFORE	
MALES	5.78	6.01	6.03	5.76	6.04
FEMALES	5.69	5.90	5.66	5.93	6.08

NOTE: The lower the score, the more reassurance

The post-Attitude toward Safety Practices Survey consisted of the same items as those used in the pre-Attitude Survey, but in a different randomized order and with different unscored filler items. The Survey was used to provide information, on a more generalized basis, of the subjects' evaluation of how helpful it would be in preventing the occurrence of dangerous driving situations, and often resultant accidents, to follow safe driving practices. There appears to be no significant differences in the attitudes of any of the experimental groups, as to the helpfulness of following safe driving practices. This is shown in Table 19. The data was further examined to see if there were shifts in attitude by any of the experimental groups from before the program to after the program. Paired t-tests showed no significant change in attitude for any group with the exception of the girls in the low threat, after placement group, whose attitudes improved ($p < .10$).

TABLE 19
ANALYSIS OF VARIANCE OF POST-TREATMENT
ATTITUDE TOWARD SAFE DRIVING PRACTICES SCORES

Source	df	SS	MSS	F
Treatments	4	319.65	79.91	.59
Sex	1	272.02	272.02	2.04
T x S	4	368.58	92.14	.69
Error	356	47460.65	133.31	
Total	365	48420.90		

Further data analysis was used to investigate the possibility that those students whose attitudes improved also had better retention of the material. In this analysis, the subjects in each threat group (Low and High) were sub-divided into two groups, those whose attitudes improved and those whose attitudes became worse. The final examinations of these students were compared using analysis of variance. Table 20a shows that there were no significant differences between any of the four groups for each sex. However, examination of the means for these groups, Table 20b, shows that in three out of four cases those students whose attitudes improved had better retention of the safe driving material than those students in the same intensity group whose attitudes deteriorated. No difference in the fourth case, girls in the low threat group, was found.

TABLE 20a

ANALYSIS OF VARIANCE OF CHANGE IN ATTITUDE TOWARD SAFE
DRIVING PRACTICES RELATED TO RETENTION OF DRIVER KNOWLEDGE

Source	df	SS	MSS	F
Treatments	3	25.59	8.53	.52
Sex	1	46.85	46.85	2.88
T x S	3	43.67	14.55	.89
Error	223	3627.77	16.26	
Total	230	3743.90		

TABLE 20b

MEAN POST-TREATMENT DRIVER KNOWLEDGE SCORES
BY ATTITUDE CHANGE AND INTENSITY

<u>Intensity</u>	<u>Treatment Groups</u>			
	<u>LOW</u>		<u>HIGH</u>	
	<u>Attitude Change</u>	IMPROVED	DETERIORATED	IMPROVED
MALES	20.3	18.9	19.4	18.3
FEMALES	17.9	18.2	18.8	18.3

Individual motivation to avoid physical harm

It was suspected that an interaction might occur between the level of concern about avoiding physical danger and the threat material. The effect of this interaction might possibly cause differences in retention of the safe driving material. In order to investigate this hypothesis, prior to the start of the course, all subjects were given a Physical Anxiety Scale to complete. The scale consisted of twelve items and was in essence the same scale used by Janis and Feshbach (1954) in an earlier experiment on anxiety.

A measurement of physical anxiety was made for all subjects. The procedure was to obtain median scores on physical anxiety for each experimental group, and divide each intensity group at the median to produce high and low anxiety groups for the low threat, high threat, and control conditions. The Final Examination scores for the subjects were used to analyze differences in retention by subjects with high or low physical anxiety for each threat level.

The Analysis of Variance, Table 21a, shows that significant differences did occur in the amount of retention by subjects with high or low physical anxiety. Examination of the Table of Means for the Final Examination scores of these groups, 21b, shows that both the boys and girls with high anxiety did better than those with low anxiety when presented with low threat material. However, very little difference was found in the amount of retention by the low or high anxiety people when faced with high threat material.

Table 21b also shows the means for the low and high anxiety subjects in the control group which was given no emotional material. It can be seen that for both boys and girls, those with low anxiety had higher retention of the factual material than those with high anxiety.

TABLE 21a

ANALYSIS OF VARIANCE OF POST-TREATMENT DRIVER KNOWLEDGE
SCORES RELATED TO PHYSICAL ANXIETY

Source	df	SS	MSS	F
Treatments	5	204.18	40.83	2.23*
Sex	1	104.82	104.82	5.72**
T x S	5	45.61	9.12	.49
Error	354	6476.90	18.29	
Total	365	6831.51		

* $p < .05$
** $p < .025$

TABLE 21b

MEAN POST-TREATMENT DRIVER KNOWLEDGE SCORES
BY PHYSICAL ANXIETY AND INTENSITY

Intensity	Treatment Groups					
	LOW		HIGH		CONTROL	
	Low	High	Low	High	Low	High
MALES	18.89	20.25	19.03	18.89	20.25	17.60
FEMALES	17.24	19.03	18.39	18.78	18.03	17.00

Sex differences

Highly significant sex differences were found to exist in the present study. As might be expected, boys had significantly more driving knowledge than girls prior to the experimental program ($p < .005$). On the Final Examination the knowledge level was higher for boys than girls, but the significance level between sexes was slightly reduced ($p < .025$). By the time the delayed Final Examination was given the level of significance between boys and girls had again increased ($p < .005$).

Furthermore, if the data is controlled for attitude toward safe driving practices or physical anxiety, a significant sex difference is still found. In both cases, the boys had significantly greater driver knowledge than the girls.

The following other sex differences were observed in the study:

(1) Credibility of the emotional inserts. The girls perceived the chances of personal involvement in the accidents described in the case-studies as significantly higher than the boys ($p < .005$).

(2) Arousal of affective responses. Significantly higher amounts of emotional tension were induced by the case-studies in girls than in boys ($p < .005$).

3.3 SUMMARY OF FINDINGS, EXPERIMENT II

The experiment was designed to study the effects of emotional communications on the learning and retention of safe driving practices in emergency situations. An attempt was made to motivate subjects to learn and retain this information by stimulating fear reactions. The fear-arousing material consisted of case-studies at two fear intensity levels placed either before or after the relevant learning content.

The case-studies had either high or low threatening stimulus material describing a driver in an emergency situation. In the high threat cases serious bodily injury resulted, while in the low threat cases, a near accident or minor property damage resulted. Although the case-studies differed according to treatment group, the driving information in the programmed manuals was the same for all treatments. The programmed material was divided into seven chapters, of which three contained fear stimulating material.

The design established five treatment groups: a control group which received the factual learning material, but no emotional case-studies; and four treatment groups, receiving both factual and emotional material, covering the combinations of placement and intensity.

Equivalent groups of ninth grade students, male and female, used the five different forms of the programmed books as part of their classroom assignment for driver education. There were 366 students in the experiment, 28 males and 33 females in each of the four treatment groups, with 56 males and 66 females in the control group.

At the beginning of the experimental program the subjects were asked to provide three kinds of data: (1) information on their present knowledge of driving practices; (2) attitudes toward safe driving practices; and (3) level of physical anxiety.

After they had worked through the programmed material, all subjects, excluding controls, completed a questionnaire which presented the stems of the case-studies, but not the emotionally-toned consequences. The subjects were asked to give their estimate of the danger, interest, and credibility of the incidents described in the case-studies. All subjects, including controls, then (1) filled in the questionnaire dealing with attitudes toward safe driving practices again; (2) estimated how dangerous they perceived fourteen statements describing incorrect driving behavior to be; (3) completed a twenty-six item multiple-choice information test measuring acquisition of the knowledge of safe driving practices; (4) indicated how reassuring they felt the recommended safe-driving practices would be in avoiding emergency situations; and (5) gave a general evaluation of the programmed learning course. One month after the completion of the programmed course the subjects were again given the twenty-six item information test, measuring retention of the information in the programmed manuals.

The fear appeals were successful in arousing different affective responses. Those treatment groups receiving the high intensity threat case-studies developed significantly more emotional tension than did those groups receiving the low, according to student ratings of the case-studies. The high and low threat endings to the case-studies did not appear to have an influence on the students' interest or estimate of the credibility of the case-studies.

All forms of the programmed manuals were equally effective in teaching the factual information on emergency procedures as assessed by an information test given immediately after completion of the program and repeated one month later. Although intensity influenced emotional reactions, it did not influence learning efficiency. Furthermore, placement of the emotional material did not influence learning.

The emotional responses generated by the case-study material evidently generalized to driving situations mentioned in the programmed material, but for which no emotional material was given. The high intensity treatment groups indicated significantly higher perceived danger for the driving situations statements than did the low intensity treatment groups. The control group reported the least danger and the high threat group the most.

No significant differences were found in student reaction to the material. Trends in the data, which need corroboration, indicated that the low threat, as opposed to the high, saw the recommended driving procedures as being more helpful in avoiding emergency driving situations. The control group felt the least adequately prepared. A related trend indicated that the control group gave a more favorable evaluation of the programmed material than the high threat group. This finding indicates decreased acceptance of the program as a result of high threat material.

Differences between boys and girls in driving knowledge were apparent in the initial driver knowledge test. These differences were also indicated by the post-test measures, a set of items completely different from the initial knowledge test and based on the information contained in the learning program. These differences were maintained when the data were controlled for a driving attitude measure and a measure of physical anxiety. Differences were also found in the amount learned as a function of individual anxiety about physical harm. In the control group, those subjects with low physical anxiety learned more than those with high physical anxiety. However, in the low threat treatment group those subjects with high physical anxiety learned more, while no differences in learning were found for the high threat group for subjects varying in physical anxiety.

IV. OVERVIEW AND IMPLICATIONS

In the final section of this report, we present an overview of the two experiments that have been conducted and their significance for a third experiment we propose to conduct. We will delineate the relationships between the two experiments and their consequences for the next experiment by a comparison of their objectives, procedures and results.

4.1 EXPERIMENTAL OBJECTIVES

The experiments were prompted both by the practical need to reduce the tedium of long self-instructional programs, and by theoretical interest in the relationship between emotional arousal and learning. The first experiment was concerned with the effect of the intensity and placement of fear-arousing case-studies on learning and retention of safe driving practices. Both intensity of fear-arousal and order of presentation were varied systematically so that the results could be compared with findings of existing research, and so that hypotheses could be generated which would predict how to manipulate emotional stimulus variables (within a programmed learning format) for maximum student learning and retention.

The second experiment was based on the strongest findings from the first one. The fear intensity and order of presentation conditions which produced the greatest differences in student learning were selected for replication and more intensive study of their effects. The second experiment provided increased information on: (1) emotional response to and the credibility of the fear-arousing case-studies; (2) the impact of the fear-arousing stories on emotionally-toned attitudes -- including the estimated dangers of unsafe driving practices -- affective judgments of safe driving practices, and the degree of reassurance about safety imparted by reading the driving manuals; (3) the relationship between these affective changes and learning; and (4) physical anxiety as an index of individual susceptibility to the fear-arousing stories.

In order to determine the objectives of the next experiment, the results (discussed below) need to be examined in the light of our search for dependable techniques that can be applied by educators or other communication specialists in selecting appropriate means for motivating student audiences in impersonal media. The results of two experiments are obviously not sufficient for drawing broad generalizations. These experiments do indicate, however, that the manipulation of intensity of fear arousal alone does not provide sufficient leverage on student motivation and learning. The findings from these experiments indicate considerable differences in the effects of this variable across topics (emergency vs. non-emergency driving), subjects (male vs. female; low vs. high physical anxiety), and communication contexts (learning of the entire manual vs. emergency responses alone).

Basically, the first two experiments assumed that the major effect of fear stimulation is the arousal of emotional tension. Examination of the results suggests that two conditions need to be fulfilled: (1) the stimulation of emotional tension, and (2) the linkage of this response to the responses to be learned. For

emotional stimuli to be effective in promoting learning they have to serve a cue or guidance function, as well as raise the general level of arousal. They have to steer the subject to the required response.

The next experiment planned in this series is concerned with examining and testing methods for increasing the cognitive linkage of the emotional tension aroused by communications with the learning content. One difficulty in establishing a linkage between emotional appeal and recommended practices is that the emotional appeal may not be believed. The appeals may be seen as inconsistent with what the person knows or believes. Or the emotional tension may be raised so high that disbelief becomes one way of reducing the tension. This missing variable may be termed "subjective probability;" that is, the student's estimate that an undesired event may happen to him. Further understanding of this factor, in combination with emotional arousal, may lead to greater effectiveness of emotional stimulation in impersonal teaching media.

4.2 SAMPLING PLAN AND PROCEDURES

Experimental designs made in advance often cannot be followed in a field situation. An example of this problem occurred in attempting to assign subjects to experimental treatments within a classroom. Basically the sampling plan for the two experiments was identical. Since class assignment within a school is often directly or indirectly a function of scholastic ability or performance, all the treatments, including the control, were replicated within each class. However, an unexpected problem arose in the first experiment when it was found that students were often dropped or added to the classroom. Since our design for assigning subjects to treatment groups was worked out on the basis of the number of students in each class, as provided by the school in the week before experimentation began, unequal cells resulted from changes at the beginning of the experimental week. Recognizing this problem, the second experiment divided subjects into treatment

groups in the school on the first day of the experiment. This allowed for an equal number of subjects to be placed in the treatment groups. The assigning of subjects to the treatment groups for the third experiment will follow the same procedure.

Controls

In both Experiments I and II, it was assumed that the driving knowledge test was related to intelligence. As preliminary results appeared, the assumption about knowledge and intelligence came into question. Some effort was made to check intelligence scores from school records, but these records were incomplete. In the third experiment, the Otis Intelligence Test will be given to provide stronger evidence on this point.

A second factor which appeared to have an effect on learning was anxiety. In the first experiment, a measure of anxiety was obtained from the Taylor Manifest Anxiety Scale. There was an implicit hypothesis here that the interaction between neurotic anxiety and emotionally-toned learning materials would lead to differences in learning. But no differences were found. In the second experiment the idea of neurotic anxiety was changed to physical anxiety and it was found to be significantly related to learning. The third experiment will examine this relationship further.

Experience on the first two experiments has revealed a third factor which must be taken into account. This factor can be placed under the general heading of attitude, and includes the subjects' attitudes toward the content of the program, safe driving practices, and toward the programmed learning materials. Measures of these attitudes were developed for the second experiment, and for the third experiment, these measures will be further refined.

Statistical Analysis

The first experiment used as its primary analysis method simple analysis of variance with a correction for unequal cells. This resulted in a lengthy period of time being required to complete the data analysis, and did not provide information on possible interaction. In order to increase the speed of analysis, take into account possible interactions and unequal cells, a two-factor analysis of variance design (Model I, fixed factor) was used for the second experiment. This design was programmed for computer use, and thereby allowed us to investigate several possible relationships between factors in a short period of time. A similarly designed analysis of variance is planned for the analysis of the data of the third experiment.

4.3 DISCUSSION OF EXPERIMENTS I AND II

Order of Presentation

The available research provided two alternative hypotheses with respect to the effectiveness of presenting the emotional stimulation before or after

the relevant learning materials. One explanation is based on the hypothesis that information would be learned more efficiently when it follows and reduces an aroused need. An alternative hypothesis indicates that emotional stimulation prior to a learning experience may arouse responses which compete with the learning and that placement of the emotional stimulation following the learning experience operates to provide symbolic reinforcement for the responses learned.

The first experiment indicated that an emotional stimulus following the relevant material is more likely to be effective with respect to learning than one preceding it. This finding was sharpest for the male subjects and for the delayed test on the emergency materials. The second experiment, which attempted to replicate this effect by reducing the content to be learned to the emergency procedures and the number of emotional case-studies from six to three, showed no differences as a result of order of presentation.

The increased effectiveness of the presentation of the fear-arousing stories in the first experiment indicates that placement of the material may have a differing significance in programmed instruction than in a mass media presentation which requires no response from the student. In the usual presentation, emotional arousal may motivate the student to acquire the subsequent fear-reducing information. In the programmed material, where acquisition of information is required, arousal may lead to some interference with the learning process. When the learning sequence is followed by an emotional insert, the learning is reinforced by the student's being able to cope symbolically with the threatening situation described. This establishment of a cognitive linkage between correct driving practices and safety, incorrect driving practices and danger, is thus established more appropriately by depicting the aversive outcomes of incorrect practices following the learning sequence. The inability of the second experiment to replicate these results suggests that three emotional inserts may not be sufficient to establish this symbolic reinforcement pattern.

Intensity of Fear Arousal

Prior research indicates a curvilinear relationship between degrees of arousal and learning efficiency. With many means of stimulating arousal, there seems to be an optimum degree of arousal which is succeeded by the stimulation of interfering responses.

In both of the experiments conducted, the high threat stimuli were seen as having greater negative affect than the low threat stimuli. In the first experiment the lower threat conditions were superior to both the control and high threat treatments, a finding which corroborates the initial expectation of curvilinearity. These differences were sharper for girls than for boys, in the emergency as compared to the routine driving procedures, and in the delayed compared to the immediate retention tests. These differences may be interpreted to mean that the degree of emotional arousal and the cognitive linkage of the arousal to the learning materials is influenced by subject, topic, and communication variables.

The second experiment was intended to both replicate the findings of the first and contribute further information on the cognitive and affective

reactions to the emotional stimuli as a means of explicating the differences found in this first experiment. However, as was the case with the order of presentation variable, the reduction of emotional stimuli from six to three may have dissipated the results of these variables.

Sex, mixed order of presentation, and mixed levels of emotional intensity

The first experiment included conditions in which the order of presentation of the emotional case-studies was sometimes before and sometimes after the relevant learning materials. The emotional intensity of the endings was also mixed for some conditions, including emotional inserts varying in their fear-arousing potential. The most striking result of these conditions was their opposite effect on boys and girls. The mixed order of presentation conditions were most effective for the boys. The mixed levels of intensity conditions were most effective for the girls. This finding parallels the finding that the order variable was stronger for the boys and the intensity variable stronger for the girls. Additional differences between boys and girls include the superior initial driving knowledge of the boys, the lesser credibility of the stories for the boys, and the increased affective response of the girls to the stories.

On the assumption that the order variable increased the cognitive linkage of the stories within the material being learned, the lack of stereotypy may have increased the credibility of the stories for the boys, and reduced their resistance to affective arousal. For the girls, the variation in emotional intensity may have increased their emotional response to the materials sufficiently to enhance learning.

Affective Responses

The second experiment sought further information on the influence of fear arousal on attitude change. Evidence for the generalization of affective responses to the threatening case-studies was sought by asking students to rate the degree of "danger" they would attribute to fourteen driving situations described in the case-studies. The results indicated that these estimates were differentially influenced by exposure to the case-studies, with the high threat group rating them as most dangerous, and the control group as least dangerous. Although subjects did not learn the driving information differentially, they did learn to evaluate the driving situations differentially as a result of the experimental treatments. This finding suggests the import of learning of motives or values as compared to learning verbal procedures.

There is some indication, far from definitive, that the amount of fear arousal also influenced the student's feelings of reassurance after reading the recommended safe driving practices. Asked to indicate how adequately they felt the programmed material in the manuals had prepared them for handling dangerous situations, the low threat group felt more adequately prepared than the high threat group, and the control group felt the least prepared.

These findings lead to the hypothesis that fear arousal will first motivate subjects to appraise the situations as threatening. The stronger

the fear appeal, the more threat will be experienced. The stronger the threat the less the likelihood that students will feel reassured by the recommendations for safe driving practices contained in the programmed material. When fear is strongly aroused but not fully relieved by the reassurances offered, the residual emotional tension may interfere with the acquisition and retention of information. When fear is moderately aroused, the students are more likely to be reassured by the recommended practices and motivated to learn them.

Subject anxiety

The influence of subject anxiety was examined in both experiments. In the first experiment, the hypothesis derived from the literature that manifest anxiety might operate as a secondary drive to influence learning was tested with no significant results. The second experiment tested the hypothesis that subjects varying in physical anxiety would be affected differently by the threatening stimuli. The results showed differences in the amount of retention by subjects varying in physical anxiety in the low threat and control groups. In the control group, the low anxiety subjects had better retention of the driving information. This cross-over effect can be accounted for on the assumption that the students who were high on the physical anxiety scale were strongly aroused by the programmed material, but were motivated to reduce the tension by suppression rather than new learning since the tension seemed inappropriate to the situation. In the mild fear situation, the more anxious subjects performed more successfully since the emotional tensions they felt more closely matched the situations described. A secondary analysis of this data is planned to further examine this difference in susceptibility and means of coping with fear-arousal.

Revisions of initial theory

A rough sketch of the revised theoretical position would indicate two conditions which facilitate learning: the arousal of some emotional tension and the cognitive linkage of the emotional tension to the stimulus situation and to the responses to be learned. We interpreted the two major variables to be associated primarily with these two dimensions, degree of emotional tension aroused and cognitive linkage of the tension with the learning. Placing the emotional insert before the learning material emphasized the tension arousing aspects of the learning experience. Placing the emotional insert after the relevant learning material provides a symbolic reinforcement of the responses made without introducing the potentially disturbing effects of emotional tension. The addition of the notion of cognitive linkage is then a major theoretical addition, as well as a guideline for understanding the effects of symbolically-aroused motives in impersonal media.

Secondly, the theory is revised to link motivational arousal with learning more closely and precisely by showing the relationship between attitude change and change in verbal habits. The evidence from the two experiments led to the reformulation of the initial notion that aroused emotional tension is a drive stimulus which may lead to learning of responses aimed at drive reduction which interfere with learning. The revised formulation includes the association of these emotional responses to the threat stimuli, a learning process which generalizes to similar stimulus situations.

This transfer of previously learned motivational dispositions to new stimuli is very similar to the attitude change process described in many experiments. The subsequent learning of new verbal behavior is a function of such variables as the strength of motivation aroused, cognitive linkage of the aroused motive to the behavior to be learned, and the reinforcement (symbolic reassurance value) of the new learning. This formulation emphasized two related learning experiences which can take place in impersonal media: the learning of emotional evaluations (attitudes) and the learning of new verbal habits.

Thirdly, the theory is revised to further account for differences in susceptibility to these appeals. The fear-incentive value of a symbolic presentation is clearly limited by the effectiveness of the communication and the degree of fear already learned by the student. The success with which the arousal of fear mediates new learning seems to be influenced by individual differences in the cognitive linkage of emotional arousal to the stimulus situation and to the new responses. When arousal is congruent with the stimulus conditions, learning is facilitated. Inappropriateness may be generated by a number of conditions including lack of perceived congruence of the emotional response with the emotionality inherent in the topic to be learned and lack of congruence of the emotional response with the degree of threat depicted in the motivating material.

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